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Land and Population in British Tropical Africa

R. W. STEEL

LAND AND POPULATION are subjects that must be very much our concern, as geographers. *Land* constitutes the area in which men live and as geographers we are interested in its extent and in the assessment of its present and future resources. *Population* forms an integral part of our studies and we deal with total numbers, with distribution and density, with the composition and the trends of population, and with standards of living. When we bring them together and consider the *relationship* of land to population and of population to land, we are concerned with what, to my mind, is the very essence of geography which is, as we sometimes put it, the study of man in relation to his environment—in other words, the study of *population* in relation to the *land*.

Land and population in East Africa was the title of a despatch, published some months ago, by the then Governor of Kenya, Sir Philip Mitchell.[1] It is a remarkable survey of the problems of East Africa as seen by one whose service in the area extended over forty years and who had been Governor, in turn, of Uganda, Tanganyika Territory and Kenya. His purpose was "to examine the problems of the land in relation to the economic, industrial and social development of the East African region as a whole and the increase of population which is taking place." In this paper I propose to concentrate on a few particular areas with certain special types of problems associated with the relationship of land and population. Some general points should, however, be made at the outset in order to give perspective to the regional examples that follow.

Any study of land and population in tropical Africa at once reveals numerous paradoxes and anomalies. On the one hand, there are vast tracts whose economic, social and political development clearly suffers because there are insufficient people to make the most of the resources. On the other hand, there are some districts where far too many people are seeking to make a living with far too little land at their disposal. Some areas are grossly under-developed, and cry out for people or for means of communication. Other areas, in contrast, are badly overcrowded: the land has been over-used and this now shows itself in the exhaustion or erosion of the soil and in the inability of the people to maintain even their relatively low standards of living.

➤ Mr. Steel is Senior Lecturer in Colonial Geography in the University of Oxford and Fellow of Jesus College, Oxford; his article is based on a lecture he gave at the Annual Conference of the Geographical Association at the London School of Economics, on 31 December, 1953.

Table I

BRITISH COLONIAL TERRITORIES IN TROPICAL AFRICA:
AREA AND POPULATION[a]

	Area (square miles)		*Population (millions)*		*Population per square mile*
Gambia	4,003		0·28		70
Sierra Leone	27,925		2·00		72
Gold Coast[b]	91,843		4·40		48
Nigeria[c]	373,250		31·20		85
BRITISH WEST AFRICA		497,021		37·88	76
Somaliland	68,000		0·64		9
Kenya	224,960		5·70		25
Uganda	93,981		5·19		53
Tanganyika Territory	362,688		7·83		22
Zanzibar	1,020		0·27		270
BRITISH EAST AFRICA		750,649		19·63	26
Northern Rhodesia	228,130		1·98		7
Nyasaland	49,177		2·40		49
BRITISH CENTRAL AFRICA[d]		337,307		4·38	13
BRITISH TROPICAL AFRICA		1,584,977		61·89	39

[a] Latest available figures, in most cases the estimate for mid-1951.
[b] Including Togoland.
[c] Including Cameroons.
[d] British Central African figures do not include Southern Rhodesia.

A glance at such statistics and maps as are available (Table I) will probably not give this impression of under-development and over-population existing more or less side by side. British West Africa covers almost half-a-million square miles and has nearly 38 million people—31 millions in Nigeria alone. British East Africa, including Somaliland and Zanzibar, is half as large again, covering three-quarters of a million square miles, but it has only just over half the population of West Africa, rather under 20 millions. Northern Rhodesia and Nyasaland, the "colonial" parts of what is now British Central Africa, are, by comparison, small in both area (337,000 square miles) and population (a little over 4 millions). By the standards of Europe or of Monsoon Asia, the density per square mile figures are unimpressive—39 per square mile for the whole area, ranging from 13 in Central Africa and 26 in East Africa to 76 in West Africa. Even if we break these figures down further or concentrate on the figures for individual territories, there are no very high densities of population, apart from Zanzibar (270 per square mile). There is, for example, nothing comparable with the densely peopled Belgian Trust Territory of Ruanda-Urundi (on the western side of the East African plateau) where about 4 million people live on 21,000 square miles—a density of nearly 200 to the square mile.[2]

There is, in fact, no evidence of over-population in any extensive area of British Africa. There are, however, cases of the local over-crowding of people if we analyse the figures more closely and in terms of much smaller districts: and this is what we must do if our studies are to be in any sense realistic and to take any account of the diversities of regional geography. We must, for example, take note of the fact that much of British Africa is unusable, at least under present conditions, because of the nature of the rainfall. Average totals may seem adequate—in, for example, the extensive areas that have average annual rainfalls of between 20 and 40 inches. But allowance must be made for evaporation, always considerable in tropical areas, and for the often remarkable fluctuations of rainfall from year to year. On the score of unreliable or inadequate rainfall alone, we must omit from any calculations of the population-carrying capacity of the land the whole of Somaliland, perhaps a half of Kenya, and very extensive parts of both Tanganyika and Northern Rhodesia, together with large areas in the interior of the West African colonies.

Again, some districts are too high or too rocky for any human use, as in the volcanic areas of East Africa, where several mountains like Kilimanjaro and Kenya exceed 10,000 feet in height, or in the Ruwenzori massif of western Uganda. Other regions, by contrast, suffer through being too low or too poorly drained: the mangrove areas of the West African coastlands, for example, and parts of the larger river valleys, including the Volta, the Niger, the Benue and the Zambezi. Further checks on settlement and on the way of life of the African peoples are imposed by the widespread occurrence of disease-carrying insects such as the *Anopheles* mosquito (the carrier of malaria) and the tsetse fly. This fly is responsible for sleeping sickness in humans and, in livestock, for the disease *trypanosomiasis*, or *nagana* as it is often called in East Africa. It affects two-thirds of Tanganyika and five-eighths of Northern Rhodesia, and no British territory in tropical Africa is entirely immune from this scourge.

We may confidently expect that the effect of these limiting influences will be considerably modified in future years with the progress of science and medicine and with developments in technology: but as geographers, seeking an assessment of the position as it is at the present time, we are bound to take careful note of them. They help to explain why, when the density figures do not suggest any obvious pressure of population upon the land and its resources in most parts of tropical Africa (rather the reverse, in fact), it is nevertheless true to say (as Sir Philip Mitchell does) that in many areas "the pressure of people on the land is more than it can properly bear, even if the standard of farming were to be greatly improved."[3] On the one hand, there is the fact that an area considerably larger than that of Europe west of the Iron Curtain contains a population only one-fifth larger than that of the United Kingdom. On the other hand, there is the fact that some districts, where agriculture is the sole means of livelihood, have a density of population comparable with that of intensively cultivated areas like the English Fenland yet depend upon most extravagant and wasteful systems of land use, such as "shifting cultivation" or nomadic or semi-nomadic pastoralism. Behind the apparent simplicity and evenness of population distribution there lie, largely hidden and too often forgotten, marked concentrations of population where indeed "the pressure of people on the land is more than it can properly bear."

In the Eastern Region of Nigeria, for example, there are extensive parts of the Onitsha and Owerri Districts with densities of 500 or more to the square mile and, locally, much higher figures are reported—even 1,700 to the square mile according to one recently published official report.[4] In Kenya some of the Native Reserves carry average densities of more than 400 to the square mile, and the same is true of parts of Nyasaland, which supports its population only by exporting much of its surplus, as temporary labourers, to the farms, factories and mines of Southern Rhodesia and even farther afield. The growth of towns is a further cause of trouble. Ibadan in the Western Region of Nigeria, with more than 350,000 inhabitants, is outstandingly large, but within sixty or seventy miles of it there are nine other Yoruba towns, each with a population exceeding 40,000. Lagos, the capital of Nigeria, now has more than a quarter of a million people, and only two out of every five of its inhabitants are members of the local tribe, the Yoruba. Nairobi, whose site was uninhabited a little over fifty years ago, has nearly 120,000 inhabitants today, including 64,000 Africans and nearly 38,000 Indians. These figures may not be very impressive by European or American standards; in Africa, however, they are significant because they are directly responsible for many of the problems and tensions of the societies and economies of tropical Africa at the present time.

LAND AND POPULATION IN KENYA

I turn now to some specific illustrations in British Africa where the relationships between land and people are not as happy, balanced or stable as they used to be. I begin with East Africa because this is the area where so much public concern has recently been expressed about the problems of both land and population. Less than 20 million people live in an area that is 3½ times that of France, but since large parts of Tanganyika and the whole Northern Frontier Province of Kenya are virtually waterless (and so, under present conditions, uninhabitable), the area in which people live is much more limited than the figures suggest. Clement Gillman's study of population distribution in Tanganyika[5] showed that almost two-thirds of the territory was uninhabited while two-thirds of the population lived on only one-tenth of the land—notably on the fertile slopes of volcanic peaks like Kilimanjaro and Meru and in well-watered districts such as Sukumaland, an area to the south of Lake Victoria where more than a million people live and in which, as D. W. Malcolm's recently published book[6] shows so clearly, many of the signs of over-cropping and soil-exhaustion are now beginning to show.

What might be called the "natural" unevenness of population distribution has been further emphasized in some parts of tropical Africa by political action and by economic tendencies. This is particularly true of Kenya where considerable areas have been alienated to Europeans in the relatively well-watered, fertile and productive Highlands in an attempt to establish a settler-community with roots firmly based in the colony: simultaneously, as part of the same policy, the Kenya Government has established many "Native Reserves," in which Africans have their land-rights guaranteed to them but where Europeans cannot, under any circumstances, own land.

Table II

KENYA COLONY AND PROTECTORATE: LAND AND POPULATION

LAND (square miles)			POPULATION (1948 census)	
Northern Province and unclassified area	150,000		186,000 Africans.	
Native Reserves	52,000	15,250	For *c.*60,000 Masai.	
		720	Forest Reserves.	
		36,030	For high proportion of total African population of *c.*5¼ millions.	
Gazetted Highlands	16,000	4,000	Forest Reserves.	
		12,000	For European settlers (*c.*4,000 are directly engaged in agriculture).[a]	
Lakes	5,000			
Miscellaneous (Towns, etc.)	1,900			
TOTAL AREA	224,960		TOTAL POPULATION	5,405,966
			including Africans	5,251,120
			Europeans	29,660
			Indians	90,528
			Arabs	24,174
			Others	10,484

[a] Of the European population of 29,660, 17,710 live in townships (10,830 in Nairobi and 2,027 in Mombasa). There are *c.*2,700 European civil servants.

Table II attempts to provide a balance sheet for land and population in Kenya. It shows how two-thirds of the Colony—the Northern Frontier Province—supports only 186,000 out of the total population of nearly 5½ millions, while most people live either in the 36,000 square miles of the Native Reserves or in the 12,000 square miles of the "Gazetted Highlands" where land has been alienated to Europeans. Of the 30,000 Europeans in Kenya, about 4,000 appear to be directly engaged in agriculture. Figure 1 indicates the distribution of the various types of areas. It should be noted that the alienated areas, lying for the most part at 5,000 feet or more above sea-level, include some of the colony's most favoured lands from the stand-point of climate, soil and water-supply, and their value is further enhanced by their nearness to the railways. In contrast, the Native Reserves are poorly

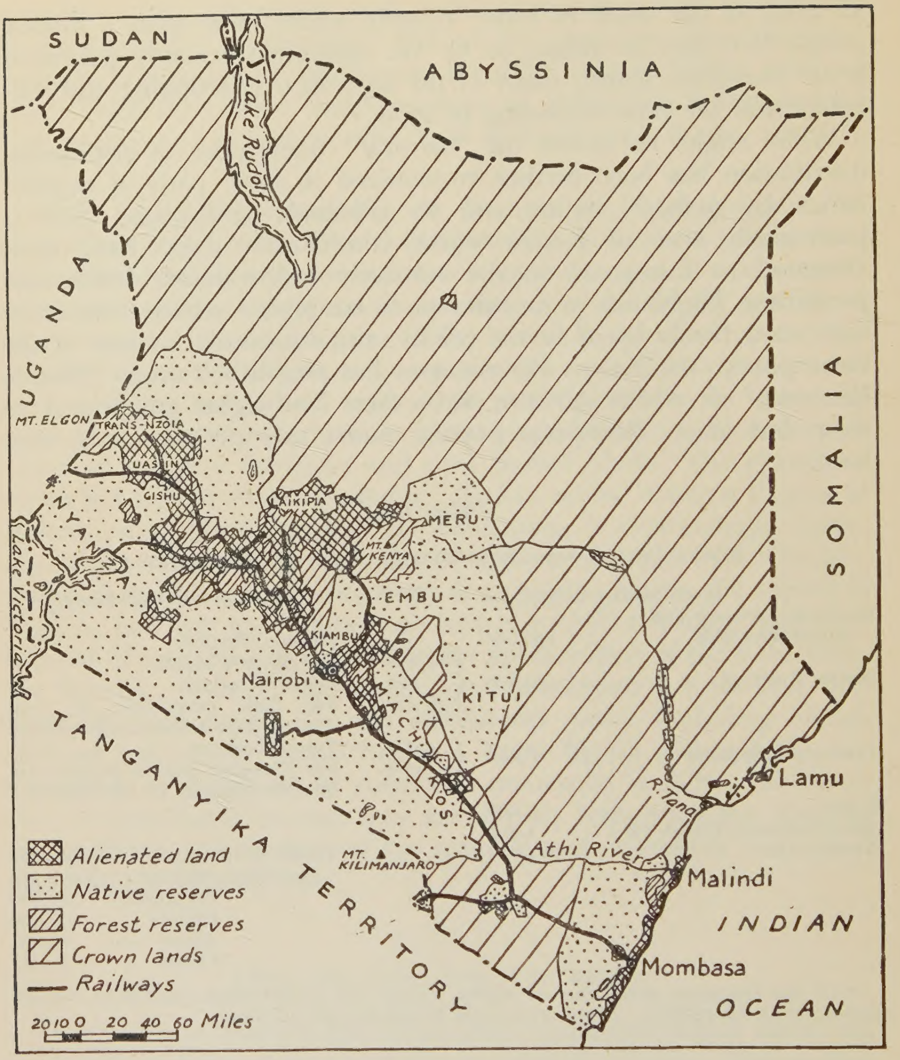


Fig. 1.—Kenya: distribution of land.

endowed by nature and are generally remote from the railways. Figure 2, prepared on the basis of the figures of the census of 1948, shows more clearly some of the problems of many of the Reserves. Several have densities exceeding 350 to the square mile over extensive areas—notably in the Fort Hall, Kiambu and Nairobi Districts; other reserves have more than 200 to the square mile (North Nyanza and South Nyeri) while the Central and South Nyanza Reserves and Kericho in the west and Embu in the centre have figures of more than 100. Under the prevailing system of African land use, these are very high densities: and they are likely to become even higher in the future for Kenya's population is increasing so rapidly that it is likely to

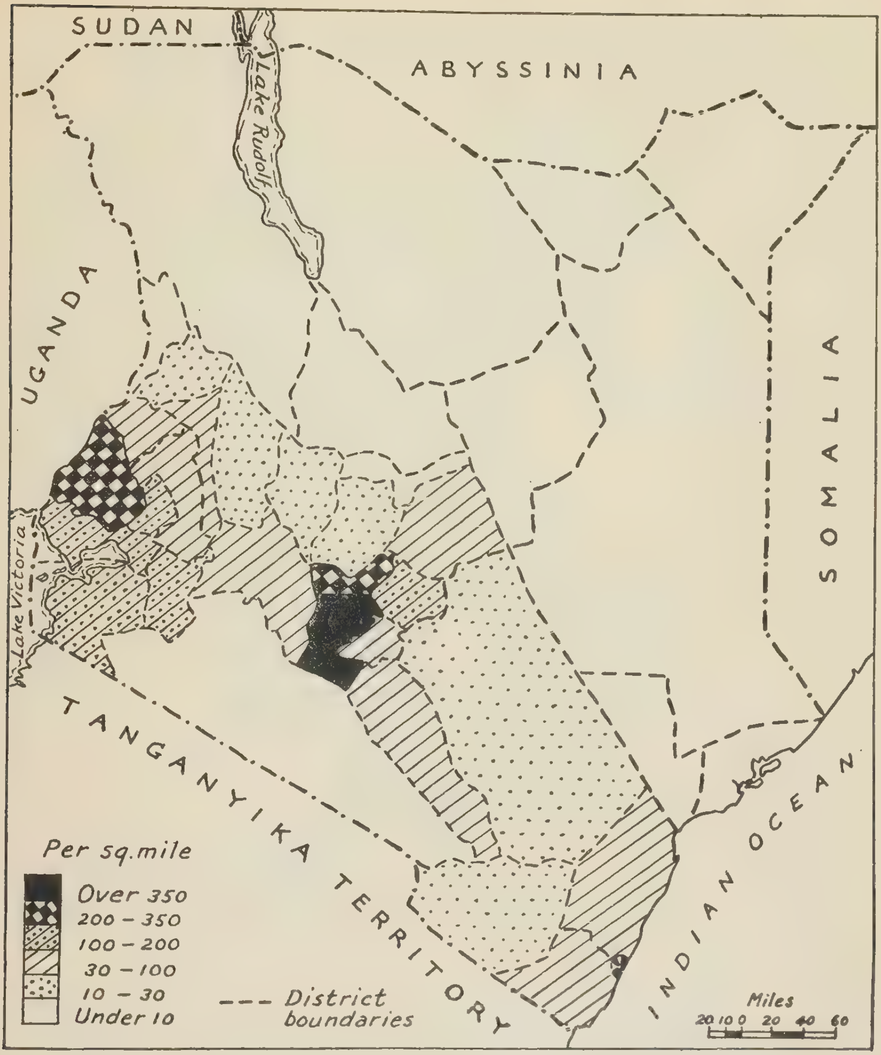


Fig. 2.—Kenya: density of population by districts.

double itself within the next thirty-five years. Kenya, hard-pressed today to maintain, at a reasonable standard of living, its 5½ million people may have to support 11 or 12 millions before the end of the century.

How is this problem of maladjustment between land and people to be met, now and in the future? We need to be careful here. Geographers, with their maps and diagrams and with their correlations of different factors, may think the solution is easy: on the face of it a redistribution of land as between European and African might achieve much. But Sir Philip Mitchell has shown clearly that even if all the land at present alienated to Europeans but not yet used by them were made available to African settlement, it "could at best provide only slight and temporary relief for African congestion."[7] The problem is, in fact, much deeper and more fundamental: it lies in the common system of cultivation and stock-raising—in the defects of the methods used and in the lowness of the yields obtained. A few years ago it was said: "An ignorant man and his wife with a hoe are a totally inadequate foundation for an enlightened state of society, a high standard of living and elaborate social services." Those words are even truer today. Here is a challenge to the best that science and technology can produce for East Africa's special needs and problems: but whatever systems may be devised they must be capable of being integrated into African society as it is and of being adopted at reasonable cost by large numbers of African farmers. For example, grandiose methods of mechanized agriculture, as tried so unsuccessfully in Tanganyika, are obviously unsuitable. Kenya needs something that is both realistic and practicable and that recognizes the nature of the ecological and sociological, as well as of the economic and political, problems. The solutions are not going to be discovered easily. Their investigation constitutes one of the main tasks of the Royal Commission on Land and Population in East Africa, set up, under the chairmanship of Sir Hugh Dow, in October 1952. The Commission, significantly, includes in its membership two experienced agriculturalists and a professor of colonial economic affairs. Among its objectives is the framing of recommendations with reference to:

(1) the economic development of the land already in occupation by the introduction of better farming methods;

(2) the adaptations or modifications in traditional tribal systems of tenure necessary for the full development of the land; and

(3) the opening for cultivation and settlement of land at present not fully used.[8]

The Commission's report may very well prove to be one of the outstanding contributions to economic and social development, not only in East Africa but in tropical areas generally, for a generation or more to come.

THE COPPER BELT OF NORTHERN RHODESIA

In Kenya the maladjustment of land and population is considerably complicated, though not primarily caused, by the presence of a European settler community. In the Copper Belt of Northern Rhodesia the chief influence is that of European and American capital, which in itself is indicative of the growing interest in the exploitation of the mineral deposits of Africa. Northern Rhodesia is a vast territory, three times the size of the United Kingdom (Fig. 3). It is 900 miles from south-west to north-east, and Ndola, the administrative centre of the Copper Belt, is 1,200 miles by rail from the nearest ports—

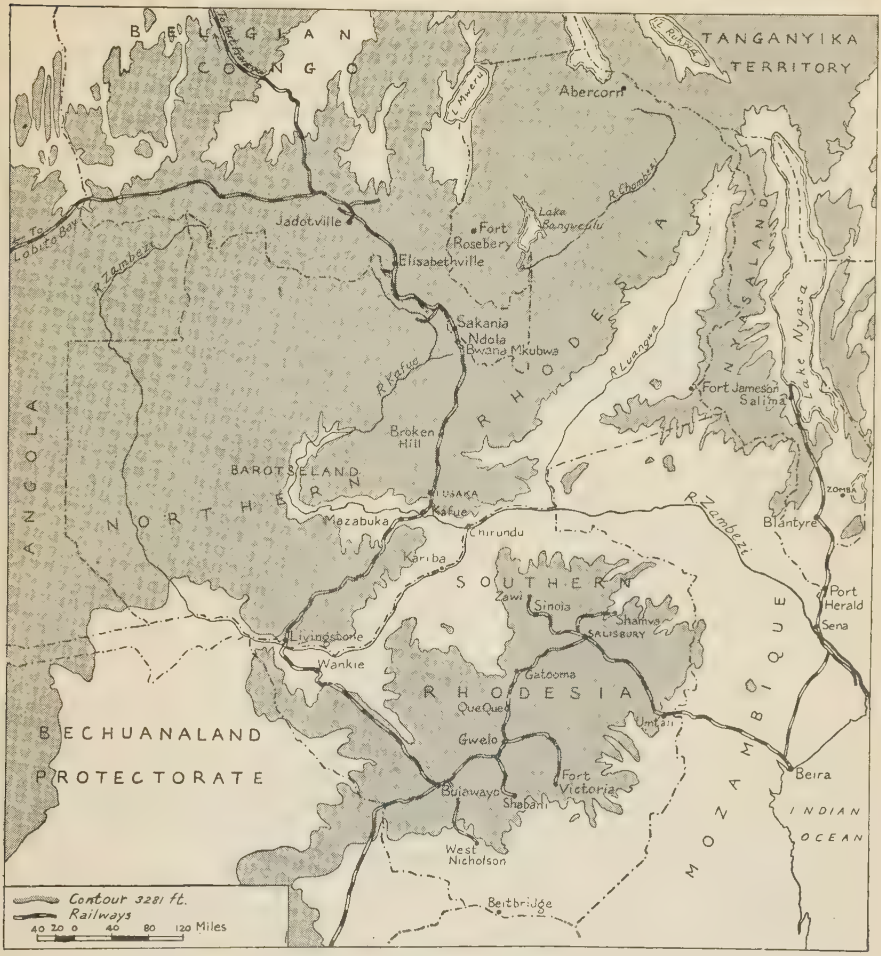
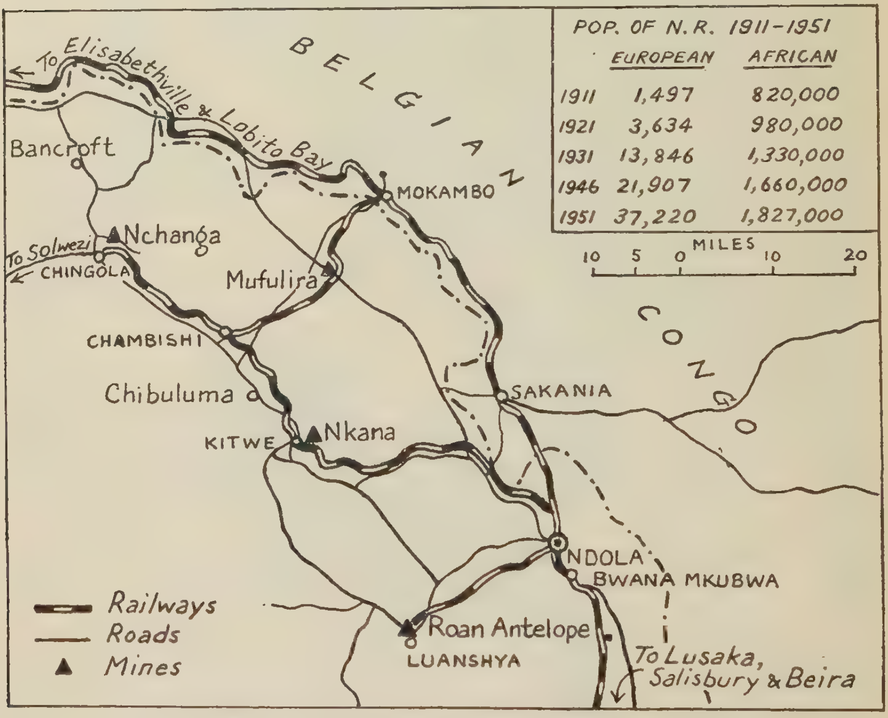


Fig. 3.—British Central Africa.

Lobito Bay on the Atlantic and Beira on the Indian Ocean. Yet its total population hardly exceeds 2 millions, for its soils are generally poor and its rainfall often erratic and unreliable. It is, however, not the poverty-stricken area today that the description so far might suggest. Thanks to the mining of copper, its economy is rapidly expanding and its prosperity is such that in recent months the value of its export trade has actually surpassed that of Southern Rhodesia, which has hitherto always been regarded as its wealthier neighbour. Originally the territory was opened up by the railway that came from the south, across the Zambezi, and on into the mineral-producing province of Katanga in the south of the Belgian Congo, but the real development of Northern Rhodesia dates from the development of the Copper Belt during the last twenty-five years. Just before the war, 212,000 tons were mined; this increased to 228,000 tons in 1941 and

309,000 tons in 1951. The value of the colony's total exports increased from £10 millions in 1939 to £82·6 millions in 1951. Unfortunately more than nine-tenths of these exports are copper. Copper is not, as is often said, the backbone of the Northern Rhodesian economy; it is virtually the entire economy, so far as international trade is concerned. Vast areas are unproductive and many are almost uninhabited because of unreliable or inadequate rainfall, poor soils, excessive isolation, or the incidence of tsetse fly which occupies extensive parts of the territory. Such prosperity as Northern Rhodesia enjoys—and it is considerable today—comes almost entirely from a mere 1,200 square miles of the land and is the direct result of the labours of less than 50,000 of the population, who work at the four great mines of the Copper Belt at Nchanga, Mufulira, Nkana and Roan Antelope (Fig. 4). In this area the links between land and people are very loose: many of the Africans in the Copper Belt are migrants who have come, in search of employment at the mines, for long or short periods, and often over considerable distances from Barotseland to the south-west and, above all, from the Bemba country that lies to the east. As yet, there has been little attempt to encourage the permanent settlement or "stabilization" of the African population: such would indeed be contrary to the policy of



POP. OF N.R. 1911–1951

	EUROPEAN	AFRICAN
1911	1,497	820,000
1921	3,634	980,000
1931	13,846	1,330,000
1946	21,907	1,660,000
1951	37,220	1,827,000

Fig. 4.—Northern Rhodesia: the Copper Belt.

both Government and the mining companies at the present time, though there are indications now of a changing attitude to this problem. There is, therefore, in this relatively small district, a concentration of uprooted, often detribalized Africans, in marked contrast to the vast districts elsewhere in Northern Rhodesia that are poorly developed and little populated—"the silent lands" as they have sometimes been rather expressively described.

The problems of the Copper Belt reflect those of Northern Rhodesia as a whole, and many of them are, in one way or another, the result of the increasing contact of indigenous Africans and European immigrants. Table III gives the population figures for various dates in Northern Rhodesia and shows how rapid has been the growth of the European population in recent years.

Table III

POPULATION OF NORTHERN RHODESIA, 1911–1951

	European	*African*
1911	1,497	820,000
1921	3,634	980,000
1931	13,846	1,330,000
1946	21,907	1,660,000
1951	37,220	1,827,000

A high proportion of the newcomers come from the Union of South Africa and are Afrikaans-speaking: many of them are convinced believers in the doctrine of *apartheid*, as expounded by the Nationalist Party Government in the Union. They formed the backbone of the Confederate Party which fought, and lost, the first Federal election in British Central Africa. They hold strong views on the question of the relationships of African and European in society generally and in industry in particular. Here in Northern Rhodesia, and most markedly in the Copper Belt, there is a real and deep-seated clash of interests and aspirations in a multi-racial society. The controversy turns largely on the question of rights. What are the Africans' rights—in land, in employment, in politics, in education, in the profits of the mining industry, and what are his obligations to society at large? What are the rights—and what the responsibilities—of the European settler and of the European engaged in mining or in commerce in a country where they must ever be numerically very much in a minority, however great their importance in society, economics or politics?

The word "partnership" has been much used in recent years in the many discussions on Central African Federation. Here in Northern Rhodesia more than anywhere else there would seem to be at the moment both a need and a scope for a really practical application of partnership. With it, there is a prospect of the orderly development of the Federation for the mutual benefit of both African and European;

without it, there will be a grave danger of economic dislocation, social confusion and political chaos.*

LAND AND POPULATION IN THE GOLD COAST

In Northern Rhodesia, as in Kenya, the European has brought new economic opportunities to the country but he is also directly (however unconsciously) responsible for many social and political difficulties, and has undoubtedly intensified some of the problems of land and population. West Africa is a part of the continent where, for climatic and other reasons, the European has not gone as a settler, and where, so far as the British territories are concerned, there has been no alienation of land to Europeans or other non-natives. Does this comparative lack of Europeans affect the relationships of land and people? West Africa is able to support many more people (Table I): the Northern Region of Nigeria alone has almost as large a population as the whole of British East Africa. Many parts of West Africa are better watered and generally more productive than areas in East Africa, and there are no population problems comparable in their intensity with those of East Africa. Moreover, where there are problems, they lack the special difficulties that arise from European participation in economic activities, as in the Kenya Highlands and in the Northern Rhodesian Copper Belt.

There are, none the less, several problems concerned with the relationship of the density and growth of population to the resources of the land that repay careful study. They include those arising from pressure of population in the Onitsha and Owerri districts of the Eastern Region of Nigeria already briefly referred to;[9] or the manner in which remarkably high densities of population are supported around some of the large emirate capitals in Northern Nigeria, notably Kano, where the land is cultivated very carefully and intensively—a most skilful adaptation of man to a by no means promising or ideal environment;[10] or the extent of soil exhaustion and erosion over much of Sierra Leone, resulting from over-farming and now, happily, being ameliorated in places by the adoption of rice-farming in the hitherto unused swamps.[11] But perhaps the best lessons can be taken from the Gold Coast, the territory where there has been maximum African progress from every point of view, with, at the same time, a minimum of direct European intervention.

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* On 29 July, 1954, the following resolutions were proposed in the Legislative Council of Northern Rhodesia by Mr. J. S. Moffat and adopted with one dissentient voice:

(1) The objective of policy in Northern Rhodesia must be to remove from each race the fear that the other might dominate for its own racial benefit and to move forward from the present system of racial representation in the territorial legislature towards a franchise with no separate representation for the races.

(2) Until that objective can be fully achieved a period of transition will remain during which special arrangements in the Legislative and Executive Councils must continue to be made so as to ensure that no race can use either the preponderance of its numbers or its more advanced stage of development to dominate the other for its own racial benefit.

(3) During this period of transition, special legislation must be in force to protect, to the extent that may be necessary, the interests of either race. Meanwhile this Council notes and agrees with the statement of the Secretary of State that it is the duty of Her Majesty's Government to ensure that on contentious issues the balance is fairly held.

(4) Every lawful inhabitant of Northern Rhodesia has the right to progress according to his character, qualifications, training, ability and industry, without distinction of race, colour or creed.

These "Moffat Resolutions" represent a real attempt to define "partnership" and their adoption by the Council may have very important consequences in Central Africa.

The population of the Gold Coast, 4,400,000 (rather less than half that of Greater London), is spread over an area equal in size to that of the United Kingdom. Thus the average density of population is 48 to the square mile, but in fact two-thirds of the people live in the southern half of the country, and another one-eighth is concentrated in the extreme north-eastern corner. Extensive areas in the Volta basin have almost no inhabitants, since they are flooded during the rains and virtually waterless during much of the rest of the year. It is in the southern districts that nearly all the economic development of the Gold Coast has taken place (Fig. 5). Cocoa, first introduced in the Akropong and Aburi areas of the south-east seventy-five years ago, has spread steadily through the forest country where the ecological conditions are peculiarly favourable to cocoa. In recent years the disease known as "swollen shoot" has taken a heavy toll of many of the older-established cocoa areas, notably around Koforidua and Tafo, so that new cocoa-farming districts have developed towards the west and north-west. Also in the southern parts of the country there has been increasing working of minerals during the past half century, particularly of gold (especially at Tarkwa, Prestea, Obuasi, Konongo and Bibiani); manganese (at the Nsuta mine, the world's largest exporter of high-grade manganese); industrial diamonds (in the Birim valley, centred on Akwatia); and bauxite, which has already been worked at Awaso (to which the railway from Dunkwa was specially built during the war to open up the mines) and at Mpraeso, while future mining is planned to take place at Yenahin to the west of Kumasi.

It is hardly surprising to find that the south, the scene of most of this economic activity, possesses all the railways, most of the road network, and the majority of the towns, including all those with more than 20,000 inhabitants. Thus within the single political area of the Gold Coast two distinct economic regions may now be recognized. One is already developed and is still rapidly progressing: the other is undeveloped and indeed hardly seems capable of much economic advancement, at least until its communications are improved, though an interesting mechanized agricultural pilot project has been established at Damongo (the Gonja Development Scheme), which it is hoped will improve agricultural methods and also increase food supplies. This already marked disparity between north and south will become even greater if the Volta River hydro-electric power project is carried through as planned. The proposal is to dam the Volta at Ajena and so create a vast lake covering 2,000 square miles, and to generate electricity which will be used particularly for the refining of locally-mined bauxite and the production of aluminium. Thus the south will have the dam, the generating plant and most of the lake, as well as the bauxite mines and the smelter, which will be built at Kpong. In connection with this scheme various railways are proposed and a new port is being built at Tema, a few miles east of Accra. These, and other, developments suggest that the south will have to depend, even more than it already does, on supplies of labour which it draws in considerable numbers from the Northern Territories of the Gold Coast and from the French territories beyond.

The Gold Coast exhibits a degree of economic activity and attainment that is unknown in Kenya, where European settlers account for nearly all of the export trade, and it possesses a range and diversity of economic development that is conspicuously lacking in Northern Rhodesia. Moreover it has none of the tensions that are so noticeable in Kenya through the proximity of African and European, nor does it depend excessively, as Northern Rhodesia does, upon a single commodity produced from a very limited area. But it is wrong to assume that the Gold Coast will, therefore, have no problems of population growth and land use comparable with those of Kenya and Northern Rhodesia. Here in West Africa, as in East and Central Africa, the dominant system of farming throughout the forest country is notoriously wasteful of both land and labour. Whether we call it "shifting cultivation" or "bush fallowing" or even "rotational farming," and however much we regard it as a not unreasonable adaptation to environment, we cannot deny that it is a most extravagant way of using the land. It may be satisfactory so long as there is, to use Sir Keith Hancock's phrase,[12] "plenty of elbow-room," but it ceases to be practicable as a system of agriculture where population is growing, apparently quite rapidly, both by natural increase and by the immigration of labour from the north. Furthermore, at a time when there is need to produce more food than ever before, an increasing area is being taken for purposes other than that of the cultivation of crops for local consumption: for the growing of permanent crops for export, such as cocoa; for mining operations; for houses, schools, other buildings, roads, and so on. Where shifting cultivation is practised, so much land has, in any one season, to be left fallow in order that it may recover its fertility through the regrowth of the natural vegetation. The proportion of fallow varies considerably with the length of the rotation. Ideally land is cultivated only one year in ten or even twenty years: but if there is pressure of population upon the land available for cultivation in an area, the figure may drop to five and sometimes even to two or three. Round a large town land may have to be cultivated almost continuously, but in such cases yields are usually very low.

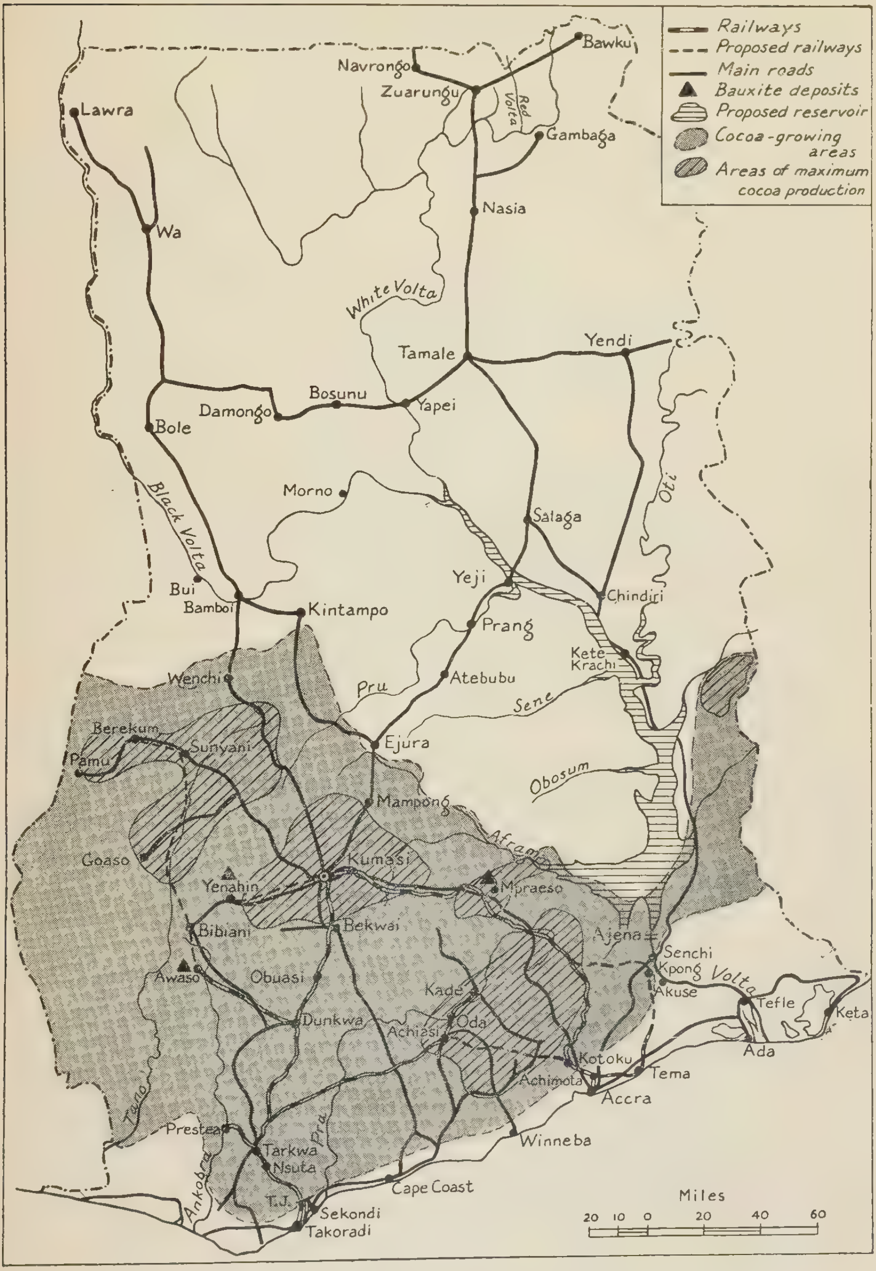

Fig. 5.—The Gold Coast: economic development. A new port is being built at Tema, and if the Volta River scheme is carried out a dam will be placed at Ajena to create the lake shown in the map. The smelter will be built at Kpong. Various proposals for new railway construction are shown including that of a line from Awaso into western Ashanti at Berekum. For further details see "Recent railway developments in the Gold Coast," pp. 49–50 of this issue.

Problems such as these were studied in the Gold Coast a few years ago by the Ashanti Social Survey.[13] A land-use survey of the immediate neighbourhood of the town of Agogo showed the areas under forest or cocoa or food crops and indicated the very great extent of the land that had been cultivated at some time in the past but was lying fallow at the time of the survey in 1946. The study suggested that this part of Ashanti has undergone a real commercial and industrial revolution, but that its food-producing methods have hardly changed at all. One cannot view with any confidence the food supplies of the future, especially when it is recognized that not only is the total population increasing quite rapidly but that there is a steady growth in the numbers engaged in occupations other than agriculture. Clearly there is an urgent need in Ashanti, and in West Africa as a whole, for more intensive and productive methods of food-farming. But what methods can be adopted in areas where tsetse fly prevents the keeping of livestock and, therefore, the development of mixed farming systems; where problems of transport and supply make difficult the application of chemical manures; and where, in any case, we do not yet know enough of the reactions of tropical soils to artificial fertilizers to ensure that they are applied in the right manner and in the correct quantities? Scientific research still has innumerable problems and almost unlimited scope in many parts of tropical Africa.

Among other problems of land and population in the Gold Coast studied by the Ashanti Social Survey was the significance of the growth of towns and of the steady increase in the urban population. More recent figures, those of the comprehensive census of 1948, show that there are nearly 60 Gold Coast towns with more than 4,000 inhabitants and that the majority of these are in the commercially developed south. Judged by tropical African standards, two at least of these towns are quite large—Accra, the capital of the Gold Coast, with 140,000 and Kumasi, the chief town of Ashanti, with 80,000 people. They already show many of the problems that we associate with towns in Europe and North America. There would seem to be a very strong case for the most careful planning of land use and for the most stringent control over the growth of towns if serious problems in the relationship between land and people are to be avoided. No amount of political progress will compensate, either now or in the future, for the emergence of social or economic problems that might have been avoided had they been recognized and properly tackled in the early stages of their development.

From these three illustrations chosen from Kenya, Northern Rhodesia and the Gold Coast, many lessons of general applicability could be drawn. But two special points may be emphasized. One is the fact that geography is always a dynamic subject, and in tropical Africa there are any number of topics for the fullest understanding of which a training in, and a knowledge of, geography should stand us in good stead. The fundamental problems in Africa today are (to paraphrase Sir Philip Mitchell)[14] those of *man* in relation to the *land* and to the new forces and pressures which the opening of the continent to external social and economic influences has introduced.

The second point refers to Britain's responsibilities in tropical Africa today. These are greater, not less (as is sometimes suggested), than ever before, if only because of the intensity and seriousness of these problems of the relationship between the land and the people, of which this paper has given a few examples. It is essential that there should be a really well-informed public opinion on matters of this sort in this country, as well as in Africa, at the present time. Here there is a direct challenge to us—in our thinking, our reading, and our teaching.

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Recent Developments in Nigerian Export Crop Production

R. MANSELL PROTHERO

UNDER THE CONSTITUTIONAL CHANGES which will establish a federal government it is probable that within the next few years the Eastern and Western Regions of Nigeria (though probably not the Northern Region) will discard their colonial status and become masters of their own political and, at the same time, their economic fate. The successful administration of both internal and external affairs will depend, to no small degree, on the development of a secure and balanced economy. It is questionable whether, up to the present time, economic development has kept pace with political development and it is doubtful if the leeway can be easily made up.

The Problem

Nigeria is essentially an agricultural country, the majority of her people work on and live off the land and agricultural products rank very high in the total value of exports.

AGRICULTURAL EXPORTS

	By Value	*£ 000's*	*By Volume*	*Tons*
	1939	1951	1939	1951
Cocoa	1,776	36,565	113,841	121,478
Oil Palm Products	2,803	36,033	426,000	497,000
Groundnuts	1,048	10,629	147,000	141,000
Cotton	204	5,754	4,384	15,574
Bananas	314	2,203	61,850	71,812
Hides and Skins	716	7,914	7,046	12,678
Total	6,861	109,098	760,121	859,542
Total (All Exports)	10,469	130,358		

Source: *Nigeria Handbook of Commerce and Industry.* Lagos 1952.

The increase in the value of Nigeria's export trade in the last decade has been enormous; by 1947 it was four times the 1939 figure and since then it has increased a further 300 per cent. These increases have been primarily in agricultural products and the major ones are now sold through Marketing Boards (Cocoa, Palm Produce, Groundnut and Cotton) which deal with the world markets through the Nigerian Produce Marketing Company, Ltd. (London). The Boards regulate prices paid to the producers, making provision for possible falls in

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➤ Mr. Prothero is a lecturer in geography at the University College of Ibadan, Nigeria. This paper is a development of some points from a more general article, "Agricultural problems in Nigeria," by the writer, published in *Corona* (Journal of Her Majesty's Colonial Service), vol. 5, 1953, pp. 328–33.

world prices,* and contribute to the economic and social development of the regions in which they operate through the medium of the Regional Production and Development Boards. Though these relatively large-scale organizations have been set up to deal with the marketing of the major products, the products themselves are derived from an economy which is basically subsistence in character and on to which the production of cash crops has been grafted.

Recent Developments in Export Crop Production[1]

Within the last forty years the production of *groundnuts* for export from the Northern Region of Nigeria has increased from 19,000 to nearly 400,000 tons to make Nigeria a primary world exporter and a most important source for Britain's vegetable fats. The methods of cultivating the crop, however, are those which have been practised for centuries and the groundnut crop is grown by thousands of small farmers cultivating about two acres each per annum. The groundnut forms an essential part of the crop rotation with grains and cotton for, as a legume, it helps to restore and maintain the nitrogen in the soil. Such a pattern of production makes it virtually impossible to control standards of farming or to make accurate forecasts of production in any one year. No near estimate can be made of the amount of groundnuts grown for local consumption and, in years when the staple grain crops are poor, groundnuts which would normally go for export, are used to supplement local food supplies. The acreage of groundnuts grown for export is dependent, also, on the price offered and the attraction that it provides in comparison with that offered for cotton, the other important export crop of the Northern Region. In southern Kano and Katsina Provinces, in southern and eastern Sokoto and in the northern areas of Zaria Province there is an overlap between the cotton- and groundnut-growing regions.

Though the growth of this very considerable production of groundnuts from small scale farming is meritorious, it is very doubtful if it can be regarded as a sound basis for the future. In some cotton-growing areas the incentive of the cash return has led farmers to bring more land under cultivation than can be adequately farmed with the resources available. This process will lead to poor crops and to the lowering of quality at a time when every effort towards improvement is being made by the Marketing Board.

The total production of the cacao-growing areas of the Western Region of Nigeria is the third largest in the world and it too is based entirely on the small farmer. The individual producer owns on an average only from one to three acres of cacao trees (see Fig. 1) and the land-use pattern is one of small cocoa farms scattered through the bush.

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* It was announced in November 1952 that the Oil Palm Produce Marketing Board would be drawing on £2,000,000 from its reserves to maintain producer prices for the 1952/53 buying season at their former level.

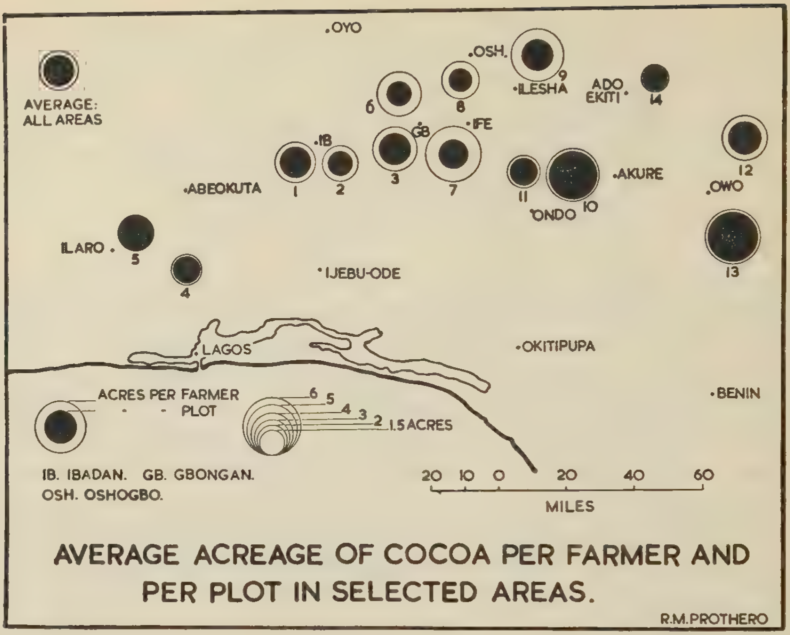

Fig. 1.
Index to areas.

Ibadan District
1 Olojuoro
2 Ajia
3 Gbongan
Abeokuta District
4 Otta
5 Ilaro

Ilesha District
6 Ile-Igbo
7 Ondo Road
8 Oshu
9 Ibokun

Akure District
10 Owena
11 Ondo
12 Idoani
13 Ute
14 Ekiti

(The map is based on information collected by the Cocoa Survey Section of the Department of Agriculture and analysed by the Economic Survey of the Cocoa Producing Region.)

This pattern has presented tremendous difficulties to the responsible section of the Department of Agriculture in controlling outbreaks of swollen-shoot disease and in attempting to assess the general conditions within the cacao-growing region. In Oyo Province,* by far the most important area of production, it was found, from the first survey completed in 1948, that over one-third of the trees were reaching an age when they would begin to decline in yield, particularly if not properly cared for. The factor of increasing tree age is one that will eventually have to be faced in all production areas (Fig. 2). But the task of persuading farmers to plant new trees is not easy and to supervise planting under present conditions is impossible for the available staff of the Department of Agriculture.

There have been examples in recent years of both large and small scale developments in the Nigerian cocoa industry. Groups of farmers have banded together to form co-operatives for marketing cocoa and to raise its quality in response to the standards set by the Cocoa

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* Oyo Province has recently been reduced in size by the creation of Ibadan Province.

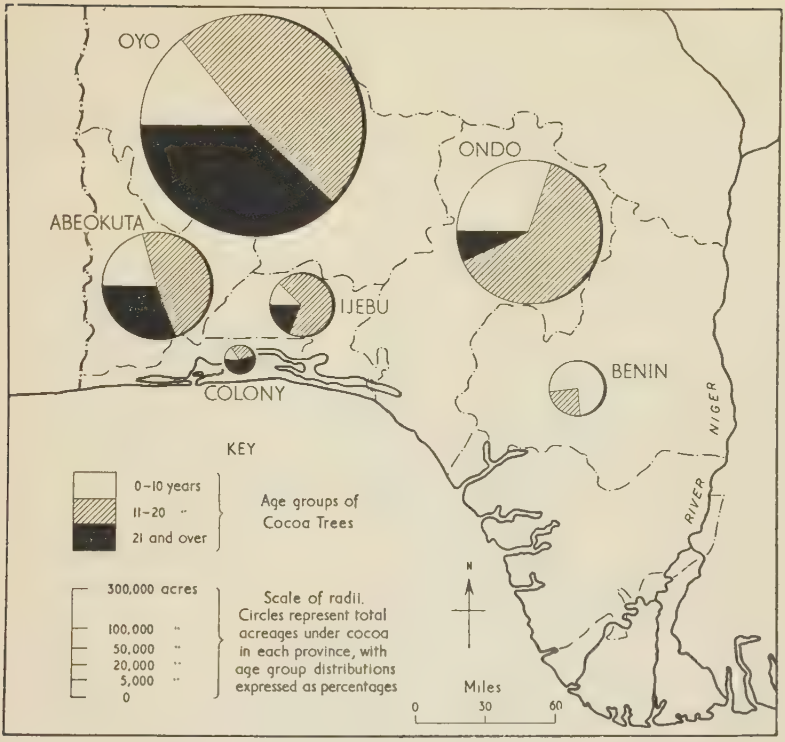
OYO
ONDO
ABEOKUTA
IJEBU
BENIN
COLONY
NIGER
RIVER
KEY
0-10 years
11-20 "
21 and over
Age groups of Cocoa Trees
300,000 acres
100,000 "
50,000 "
20,000 "
5,000 "
0
Scale of radii. Circles represent total acreages under cocoa in each province, with age group distributions expressed as percentages
N
Miles
0
30
60

Fig. 2.—Age group distribution of cocoa trees in the major producing provinces. (Based on information collected by the Cocoa Survey Section, Department of Agriculture, up to 31st December, 1948.)

Marketing Board. This body has improved quality to such an extent that practically all the cocoa that is now sent for export is of top grade. Surplus money accumulated by the Board is being used for economic and soil surveys of the cacao areas, for the building of feeder roads to facilitate collection, to endow the Faculty of Agriculture at the University College, Ibadan, and to provide scholarships for the sons and daughters of cocoa farmers at the University College. But, apart from the centralized control exercised in the overseas marketing of cocoa, production is based on small scale enterprise with a resultant lack of efficiency, especially in the application of scientific developments.

With the high prices of recent years there have been signs in parts of the region of the development of a cash economy dependent on the sale of cocoa. This has led to the planting of trees with a reduction in the amount of land under food crops and to greater reliance on food imported from other areas. The dangers inherent in this development are, firstly, the possibility of a fall in the demand for cocoa and therefore in the world price and, secondly, the possible future inability of other parts of Nigeria to supply the food requirements of the cacao region. From the point of view of the first danger, about 40 per cent of Nigeria's cocoa production is exported to Britain where, in the event of an economic depression, it would undoubtedly be classed as a luxury product with severe limitations on the amount imported. In 1939, cocoa was placed low on the list of export priorities from Nigeria and part of the crop had to be destroyed. It must at the same time be emphasized that considerable quantities are exported to the United States from which country vital dollars are derived.

The collection and preparation of *palm oil and kernels*, the major export products of the Eastern Region of Nigeria, form an industry less well organized than either the cultivation or the growing of cacao. There is very little deliberate cultivation of the oil palm in Nigeria and the bulk of the fruit are collected from trees growing wild in the bush. The density of trees varies very considerably. There is a very considerable local consumption of oil in Nigeria, the annual average consumption being as high as 100 lbs. per head in some parts of the country and the amount of oil that is available for export is the surplus after the requirements of the home market have been met. Oil production in the Western Region, where the oil palm has to compete with the cacao tree for land, is barely sufficient to meet local needs, though there is an average annual export of 100,000 tons of kernels (Fig. 3). Extraction of oil and kernels is carried out by thousands of small family groups. The whole industry, from the initial gathering of the fruit to the sale of the oil and kernels to the large trading firms and thence to the Oil Palm Produce Marketing Board, is on a small scale. In their progress from the collector in the bush to the trading firm the products may pass through the hands of anything up to half-a-dozen middlemen. Compared with the oil palm industry in Indonesia, where there is controlled cultivation and management on plantations, the Nigerian industry is inefficient and underdeveloped. The average yield of oil per acre is estimated to be 25 per cent greater in Indonesia than in Nigeria.

Land in Nigeria is held in trust by the Governor for the people and the ownership of land by European individuals or firms is forbidden. At the beginning of the present century the United Africa Company established plantations in the Belgian Congo, having failed to obtain concessions in Nigeria. These are controlled by the Huileries du Congo Belge and at the present time have an area of 85,000 acres under oil palms. During the economic depression of the 1930's, impressed by the argument that small plantations might illustrate to Nigerians the most efficient methods of production, the Government sanctioned the establishment of two plantations by a subsidiary of the United Africa Company. They are of 6,500 acres each, one in the west, in Warri Province, and the other at Calabar and are held on leasehold. Encouragement of Nigerians to establish plantations, by the provision of seedlings by the Department of Agriculture, has met with only a

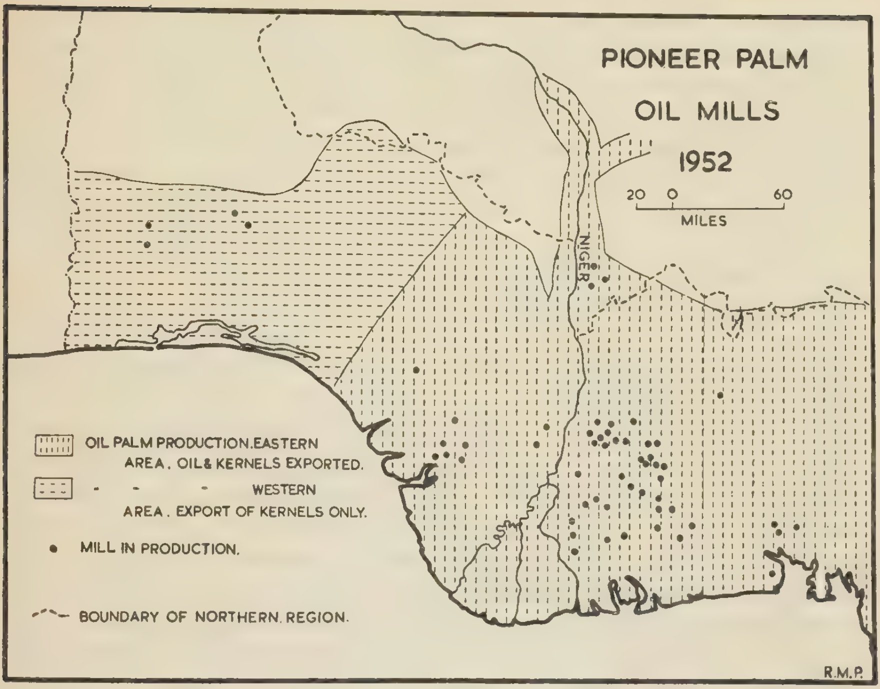
PIONEER PALM
OIL MILLS
1952
20 0 60
MILES
NIGER
OIL PALM PRODUCTION. EASTERN AREA. OIL & KERNELS EXPORTED.
" " " WESTERN AREA. EXPORT OF KERNELS ONLY.
● MILL IN PRODUCTION.
BOUNDARY OF NORTHERN REGION.
R.M.P.

Fig. 3

limited response. Difficulties include the complicated systems of land tenure in the Eastern Region and the high population densities which result in an ever-increasing shortage of land. When the Nigerian Oil Palm Research Station (now the research institute for the whole of British West Africa) was set up in 1939, the difficulty of acquiring land in the main oil palm area in the east necessitated its location near Benin in the Western Region. Recently an important sub-station has been established in the east.

The setting up of Pioneer Oil Mills by the Department of Commerce and Industries, the first of which was opened in 1946 and the introduction of hand presses to prepare the oil palm products for export have met with a mixed reception. The oil extraction rate using these new methods is 85 and 65 per cent respectively as compared with 55 per cent by the native hand methods. There is also a reduction in the free fatty acid content of the oil which improves its quality. The mills are designed to separate the oil and kernels from the palm fruit and to utilize the waste material as fuel for operating. They can only operate economically in areas where there is a dense growth of palms sufficient to give a regular supply of fruit for processing. The potential annual output of each mill is 300–350 tons of oil with a proportionate output of kernels. In 1952 there were 54 mills in operation in the Eastern and Western Regions and three in the Northern Region (Fig. 3), with another 120 mills building and on order. Relating the total potential output of these mills, when they are all in operation, to the total export of palm products in 1951 (Palm Oil 150,000 tons; Palm Kernels 347,000 tons) it will be seen that for a very long time to come a large part of Nigeria's export will continue to be prepared by native methods. Mills in operation have not been maintaining full output and there has been definite opposition to them in certain areas, in the belief that they will deprive people of their livelihood. This opposition can be very effective for if sufficiently well organized it means simply that no fruit is brought to the mill for processing.

It is reasonable to conclude that the production and general handling methods for Nigeria's three main export crops are by no means the most desirable for products entering into world trade. In the post-war years there has been a great demand for these products and the contribution of Nigeria has been more than welcome. But it may not always remain so. Competition will certainly have to be faced in the near future from rehabilitated oil palm plantations in Indonesia and probably also from the Belgian Congo. The latter territory is making noteworthy progress in tropical agricultural research and, even more important from the point of view of production, is putting the experience gained from this research into general practice for the benefit of agriculture. It is very probable that, in the past, insufficient emphasis has been placed on making the Nigerian farmer realize the advantages to be gained from adopting new methods and that to compete in the world market it is necessary to make changes in traditional practices. Opposition to change and reluctance to break with the past are very understandable features and the evils consequent on the break-up of traditional forms of social and economic organization in other parts of the world should not be forgotten. But it seems that too often the outcry for their maintenance is made the stumbling block to the adoption of progressive measures. It will have to be explained to the Nigerian people shortly, that developments in one direction may inevitably require that changes be made in others.

Imports and Exports

By value, £000's.

	1900	1939	1951
Total Imports ..	1,735	6,757	84,401
Total Exports ..	1,887	10,469	130,358

The figures above indicate the entry of Nigerian products on to the world market and the revolution that has taken place in Nigeria's trade relationships during the present century. There has been no appreciable change in methods of production to accompany this. It is very doubtful if this situation can be maintained indefinitely against increasing competition and it is necessary that changes should be made before Nigeria finds her world markets beginning to disappear. The economies of the Western and Eastern Regions, depending on cocoa and oil palm products respectively, are the most vulnerable; the more diversified production of the Northern Region (groundnuts, cotton, hides and skins) is more capable of withstanding changes in world requirements and demands.

The Future

There is no doubt that larger holdings of land are necessary to make possible the introduction of improved methods of production. The "mixed farming" movement in the Northern Region, initiated by the Department of Agriculture in 1928, has pointed one of the lines along which development should take place. Cash advances have been made to farmers to purchase a few head of cattle for draught purposes, whose manure can be used on the land. Light ploughs which local blacksmiths can repair and replace have been introduced to supplement hoe cultivation. Under this system a man is able to cultivate twelve to twenty acres where he formerly cultivated four. Mixed farming, therefore, presupposes that there is land available for this extra cultivation and to provide grazing and bedding for the beasts while at the present time it is only possible on any scale in the areas which are relatively tsetse-free. It has developed among the more wealthy farmers and those now practising mixed farming represent only a fraction of the total number of farmers in the Northern Region. However from three farmers in 1928 the number has increased to nearly 10,000. To maintain and increase fertility in the north it is essential that the traditional separation between Hausa cultivator and Fulani pastoralist should end and the mixed farming movement is a step in this direction.[2]

Apart from the development of mixed farming as a means of maintaining and increasing fertility the Northern Region Production and Development Board is encouraging the use of superphosphate fertilizer by making supplies available. It has been shown that the soils north of Zaria are deficient in phosphates and that the present annual export of groundnuts represents a loss equivalent to 17,000 tons of single superphosphate from the soils. In addition it has been demonstrated that the application of small dressings of superphosphate will give a very good return in increased yields of groundnuts, cotton and guinea corn.[3]

The problems associated with the introduction of mechanized agriculture are ones that remain to be solved not only for Nigeria but for tropical areas in general.[4] They entail not only the successful use of mechanized implements, their design and the effect that they may have in accelerating erosion on light soils, but also the reorganization of the farming unit, in order to bear the heavy financial outlay necessary for the purchase of machinery and the reorganization of the farming pattern to accommodate it. The present system of farming is totally

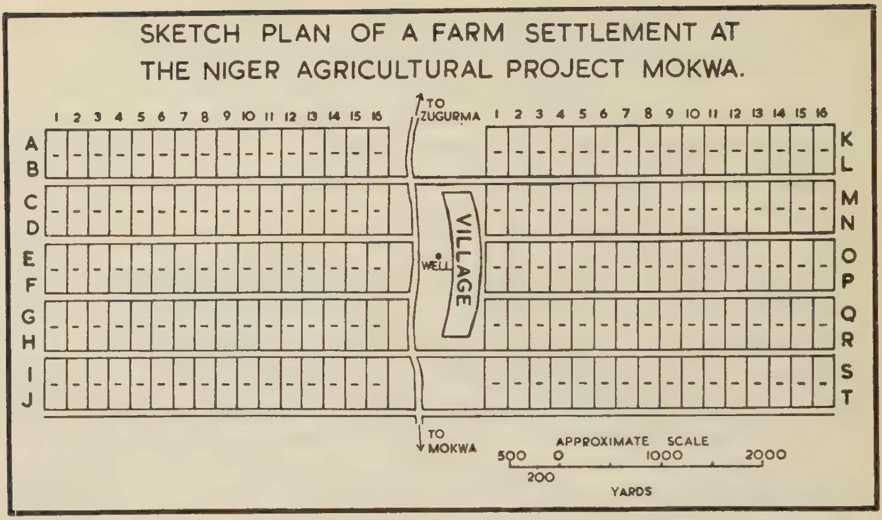

Fig. 4.

1. Land is divided into 24-acre strips, e.g. AB 1, AB 2.
2. Each farmer holds 4 half-strips, e.g. A 1, A 2, A 3, A 4=48 acres.
3. Cultivation pattern, e.g. strips 3, 4, 5, 6, 11, 12, 13, 14 under cultivation; strips 1, 2, 7, 8, 9, 10, 15, 16 under fallow.

unsuited to mechanization and, for the time being at least, it is only in those areas with land to spare and with insufficient population to farm it, especially in the busy periods of the farming year, that any possibility of mechanized farming can be envisaged. Some form of group farming is essential to meet the necessary capital outlay. In Nigeria there are several experimental schemes, one of the most important being at Mokwa in the "middle belt," organized by the Colonial Development Corporation.* The major difficulty to be met in reorganizing land holding prior to the introduction of mechanization is the traditional system of land tenure. At Mokwa it was by-passed by selecting for development an area seriously underpopulated as a result of slave-raiding in the nineteenth century. It is intended to establish ten settlements, each consisting of 80 farmers with their families housed in a specially-built village. At present two settlements are occupied. Initial clearing of the site is carried out by the Corporation, each farmer receiving 48 acres of which half are in cultivation in any one year (Fig. 4). The plots are laid out in 24-acre strips at right angles to a series of parallel roads built to facilitate the movement of machinery. Breaking of the land and ploughing are carried out by mechanized implements, the sowing, tending and harvesting of the crops by hand by the farmer and his family. By this means a farmer is able to cultivate a much greater acreage of land than would be possible using hand methods throughout. With one-third of the total return going to the farmer and two-thirds to the Colonial Development Corporation it is estimated that the farmers' incomes will be twice that of the average for the Mokwa area. The scheme is an example of the type of organization that can be aimed at, though this will generally need to be on a more modest scale than at Mokwa, where money is being spent for experimental purposes. At the present time, in Sokoto Province, mechanized implements are being used to plough *fadama* land (land lying within a river flood plain) for rice cultivation. 25,000 acres were ploughed in 1952 and 36,000 acres were planned for 1953.* This scheme is far less rigidly organized than that at Mokwa.

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* The latest development at Mokwa has been the withdrawal of the Colonial Development Corporation from control of the project which is now to be administered through the Government in Northern Nigeria. To what extent the scheme may be modified is not yet known.

There is little doubt that great changes will have to be made in the pattern of Nigerian agriculture to carry forward on a large scale measures which are being developed experimentally at the present time. To bring them about successfully will require considerable planning for in Nigeria, with its high rate of illiteracy, a great gap exists between the government and the majority of the people. Practices and outlooks are intensely localized, particularly as far as agriculture is concerned and traditional forms of land tenure may vary considerably between two adjoining districts.[5] Full recognition will have to be given to these differences. In order to feed her increasing population and also play her full part in world trade Nigeria requires something in the nature of an agricultural "revolution," but at the same time it is essential that as much emphasis as possible should be placed on "evolution" towards the new ways of life and work.

* The actual area ploughed in 1953 fell very much below this amount and was less than in 1952, owing to problems of organization and difficulties with the farmers.

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The Trient Valley: An Introductory Study

G. JOAN FULLER

FEW ENGLISH PEOPLE know the Trient Valley in southwest Switzerland. Its deep forested gorge and gentle mountain paths do not attract tourists in such numbers as the peaks and glaciers of Chamonix or Zermatt. The developments it has seen in the last hundred years, although unspectacular, have been real, varied and, perhaps, more subtle than in those valleys where all activity hangs on the tourist industry. In addition, the Trient Valley holds many problems of interest to the physical geographer.

The Trient river is one of a number of streams which flow from the Pennine Alps northwards to the Rhône (Fig. 1). Like most of the others it occupies a hanging valley and the difficulty of access in times past between its villages and the Rhône valley isolated its population and retarded economic development. On the other hand, the Trient Valley was far from being a cul-de-sac. From its entry into the Rhône valley a little below Martigny, the valley leads southwest towards the Col des Montets and the Vale of Chamonix. Thus it provides a routeway between Switzerland and Savoy.

Physical Geography

The Trient Valley lies within the inner crystalline zone of the Alps. The two chief structural elements in the area are the NE-SW trending granite batholiths of the Mont Blanc massif and the massif des Aiguilles Rouges. From both of these erosion has stripped off part of the overlying schists, exposing the granite, and in the Chamonix area, the two massifs face each other, separated only by the narrow synclinal trough of the Vale of Chamonix. But as they pass northeast into Switzerland, these massifs diverge and a third and smaller one appears between them. This is the massif de Mont de l'Arpille (Fig. 2). West of this last, the main Trient Valley occupies a syncline of Carboniferous rocks originally folded in the Hercynian epoch, and later powerfully disturbed during the period of Alpine uplift.

The evolution of the land forms of the Trient Valley has not yet been studied in detail and is clearly complex. Between the resistant formations of the two massifs, the Trient depression has been eroded in the relatively soft Carboniferous rocks but the present course of

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➤ Dr. Fuller is a lecturer in geography in the University of Nottingham. Her account is based on field work carried out in August 1951 by one of the parties of the Geographical Field Group, to the members of which she makes grateful acknowledgments.

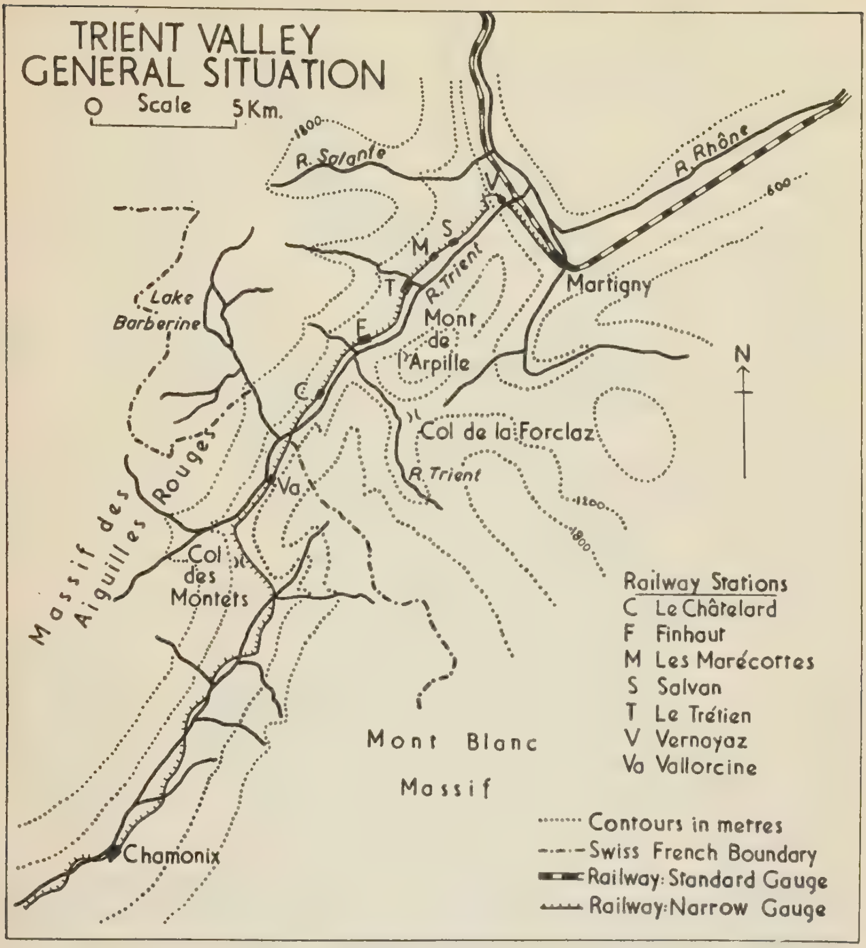

Fig. 1.

the river bears no relation to underlying structures. From its source in the Trient glacier, the river flows across the grain of the country from the granites of the Mont Blanc Range towards the Aiguilles Rouges massif. A slight change in direction above the village of Trient carries it across the southern end of the Mont de L'Arpille gneiss; below Finhaut, where it turns northeast into the main valley, it takes a similar superimposed course within the western margin of the gneiss instead of following the Carboniferous outcrop. It is the great resistance of the gneiss which accounts for the ruggedness of the Trient gorge.

This gorge is the most striking feature of the valley. Vertical rock walls, over 400 feet high, close in the narrow chasm through which the river rushes down into the Rhône and, although the sides of the gorge open out upstream, they are still very steep. Above the gorge, the great westward-facing wall of Mont de l'Arpille rises almost

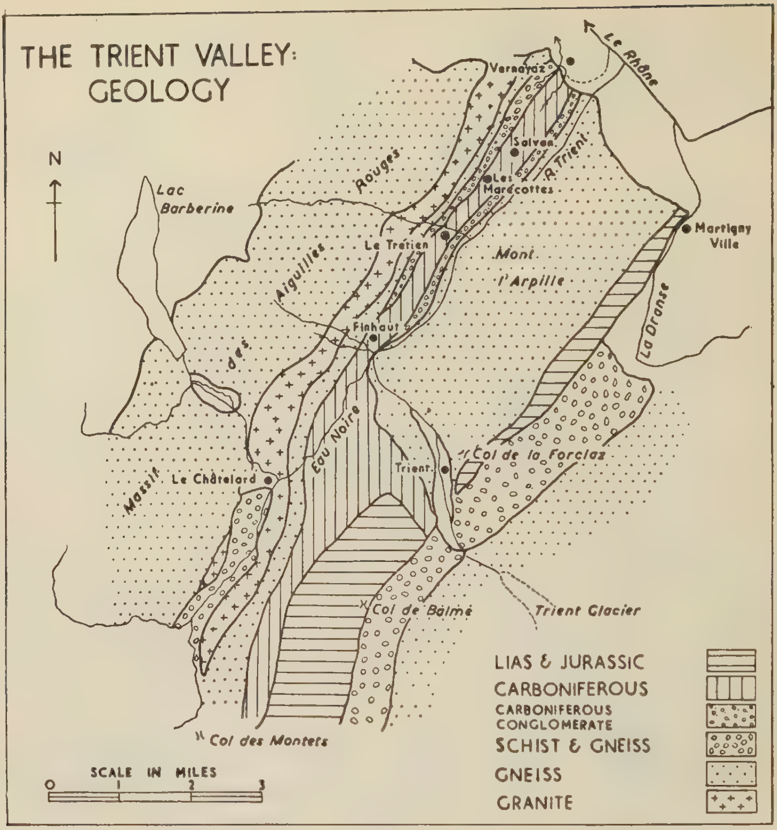

Fig. 2.

unbroken, apart from terrace fragments, to a gently undulating crest at about 6,700 feet. Such a height is not great enough for permanent snowfields and, although torrents in spring rush down the mountain side, they have not worn deeply into it. The west-facing slopes of Mont de l'Arpille, in this respect, differ greatly from those opposite.

The peaks of the Aiguilles Rouges massif rise to 8,000 or 9,000 feet on the western side of the Trient Valley. Below rocky summits the slopes are widely masked with scree and, although steep, are less formidable than those of Mont de l'Arpille. Here erosion has made deep inroads. The greater height of this range results in greater precipitation. All the chief tributaries of the Trient come, therefore, from the Aiguilles Rouges massif. Their upper courses flow through cirque-like hollows below which the streams drop into gorges. The slopes of the massif are deeply dissected and roads which follow the mountain-side terraces have found the gorges a considerable obstacle.

Between the upper and lower parts of the main valley, as is common in the Pennine Alps, there is an important contrast. In the upper, glacial features predominate, in the lower the results of post-glacial erosion. Above Le Châtelard a shallow glacial trough with an undissected floor can be seen. Below, the gorge begins, V-shaped and shallow at first, but deepening downstream to end in the chasm at Le Gueroz. Thus contact between one side of the valley and the other becomes progressively more difficult and the remains of earlier valley floors more fragmentary.

Fragmentary though they are, these relics are none the less important. Since there is no level land at the bottom of the gorge, and since the mountain sides are steep and even precipitous, settlement and agriculture are largely confined to the terraces in the main valley. Investigation has shown that there are at least three series of terraces and probably the remnants of a fourth. In addition to their geomorphological interest, the terraces exhibit certain features of importance to settlement. Firstly, although they are very fragmentary in the lower part of the valley, above Finhaut there is something approaching a continuous bench. Secondly it is apparent that, whereas above Finhaut the terraces on both sides are of approximately equal size, those below are much larger on the left bank than on the right. This fact is the key to the contrasts in settlement between the two sides of the valley.

No meteorological statistics are available for the Trient Valley and it is only possible, therefore, to suggest one or two general features of its climate. As it is situated in southwest Switzerland, it experiences the rather extreme climate characteristic of the Valais. As regards aspect, the Trient Valley lacks the strong contrast found between the northward-facing and southward-facing slopes of valleys running east to west. Nevertheless since below Finhaut the general trend becomes SW-NE, the left-bank terraces receive more insolation than those on Mont de l'Arpille, a further advantage for settlement. Temperature records taken during the first fortnight of August, 1951, on the Salvan terrace at about 3,000 feet in altitude, showed that maximum temperatures on sunny days rose to between 70 and 80° F. The high temperatures and plentiful sunshine on the Salvan and Finhaut terraces are the main physical advantages for crop growing in an area otherwise full of limitations.

Precipitation varies with altitude and the lower terraces appear to share the relatively dry climate of the adjacent Rhône valley, where Martigny has an annual precipitation of 30 inches. The crests of the Aiguilles Rouges massif receive a heavy snowfall and around the villages the snow cover lasts from December to March. Avalanches are a danger which the forests mitigate.

Forests still cover large areas of the Trient basin (Fig. 3). Before the introduction of agriculture, the whole of the main valley, apart from rock faces and scree, was probably forested up to a height of about 2,000 metres. Most of the trees are conifers, larches and firs, but at lower levels, and especially in the sheltered gorge, beeches and hazels grow.

It seems possible that clearings on the terraces may first have been made in late prehistoric times. Clearing subsequently removed the forest cover from practically all cultivable lands on the main terraces and, because of the shortage of arable ground, has advanced into the woodland on the mountain sides above. Were it not for the danger of avalanches, the forests would have diminished further, but the protection they give is so necessary that felling is prohibited above the villages. The upper limit of trees also has probably been pushed downhill to extend grazing. Mont de l'Arpille provides an example, for above 1,800 metres the slopes are gentle and are covered with grass and bushes. This is the main *alpe* on the mountain. Here it is evident that grazing has reduced what was a close forest to a lightly wooded grassland.

Human Geography

Canton Valais is generally regarded as one of the poorest parts of Switzerland. There are, indeed, certain localities which are notable exceptions as, for example, the vineyard and orchard country of the middle Rhône valley, but in many villages of the Pennine Alps the standard of life is low compared with that on the Swiss plateau. To this poverty the Trient Valley is no stranger. Nevertheless the scene is by no means one of unrelieved gloom. Like the rest of Switzerland, the valley has seen great changes in the last hundred years and its economy has shown continuous adaptation.

It is appropriate to consider first the settlement pattern. The main features both of the distribution of settlement and of the contributory factors have already emerged and may be summarized briefly. Relief is the dominant influence, confining the chief settlements to terraces in the main valley of the Trient and to the flat valley floors of the upper Trient and the Eau Noire. Relief too explains the fact that nearly all the population lives on the left-bank terraces of the main Trient Valley since those on Mont l'Arpille are small and isolated. Aspect, less important than in valleys trending east–west, adds nevertheless to the advantages of the western terraces. Further, settlement is grouped, not dispersed. This is due partly to the persistence of the peasant system of agriculture, partly to the scarcity of cultivable land with the consequence that there has been no opportunity for dispersal of settlement from an original nucleus. The development of the tourist industry and the building of the railway have also been a centripetal influence, encouraging the building of hotels and shops in the existing villages.

Permanent settlement in the main Trient Valley is found on three terrace levels. Le Gueroz, a hamlet of rather neglected appearance, is sited on the lowest terrace, a fragment so small that it has offered little scope for development. On the middle terrace there are the left-bank villages of Salvan and Les Marécottes, both relatively large settlements. The corresponding terrace on the right bank is very small

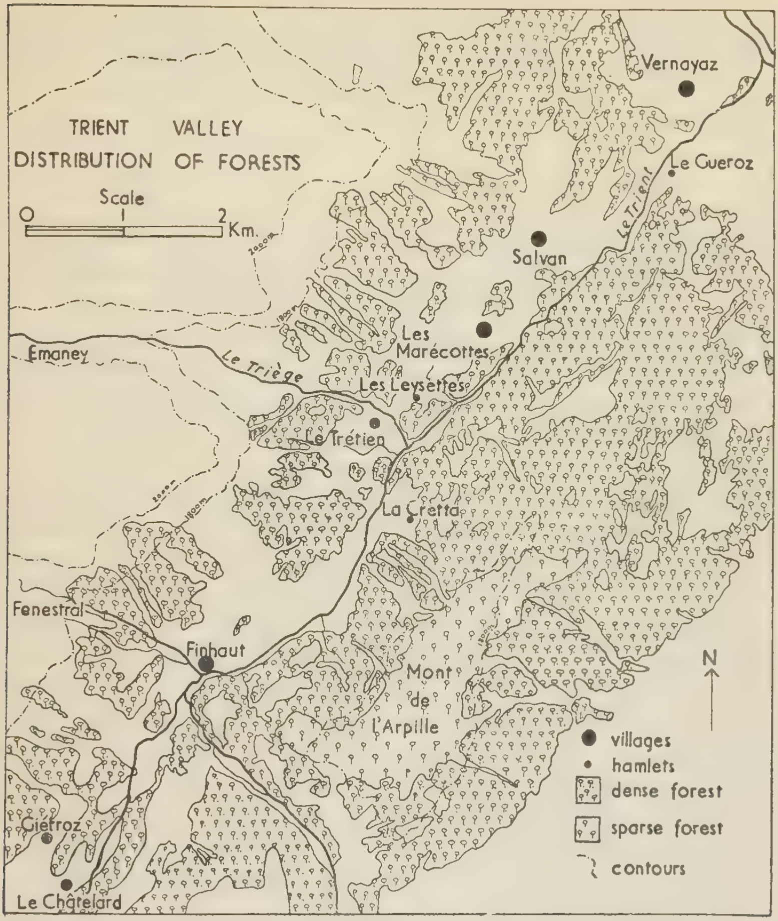

Fig. 3.

and is occupied by the tiny village of La Cretta. Higher up, Finhaut and Giétroz have grown up on the third terrace on the western side of the valley. Two smaller settlements, Le Trétien and Les Leysettes, are built, in the absence of terraces, on slopes so steep that they make a striking commentary on the lack of level land. In discussing the occupations of the valley it is important to stress the integration which is the chief factor maintaining its population. In the early part of the nineteenth century when the valley was largely self-sufficient, its people practised a limited range of pursuits. Now with the rise of the tourist industry and of factories in the Rhône valley, there is more varied opportunity and few families in the larger villages are entirely dependent on farming. Usually the older people work the land while the younger travel daily to Martigny.

As in most of the valleys of the Pennine Alps, agriculture is still important. The following figures illustrate the position as recorded in the 1941 census.

Commune	*Total Resident Population*	*Persons engaged in Agriculture*		*Persons Engaged in Industry and Crafts*		*Persons Engaged in Commerce, Hotels and Transport*		*Independent Persons*
		Males	*Females*	*Males*	*Females*	*Males*	*Females*	
Finhaut	444	69	4	43	7	28	15	76
Salvan	1,017	247	19	64	7	27	23	222

Agriculture therefore engaged 16 per cent of the total population of Finhaut, 26 per cent of Salvan. Industry and crafts occupied 11 per cent and 7 per cent respectively, most of the employment being found in Martigny. The lower numbers engaged in commerce, hotels and transport (Finhaut 10 per cent, Salvan 5 per cent), probably reflect, in part, the war-time decline of tourism. The numbers of independent persons, however, suggest that both settlements had become to some extent residential.

Since agriculture still supports a large proportion of the population, the limitations imposed by physical conditions are especially significant. The scarcity of level or gently sloping land has been mentioned. This difficulty becomes more apparent on closer investigation for on the terraces *roches moutonnées* are found in hundreds. There is also the drawback that the soils, derived mainly from crystalline rocks, are generally thin and poor. So important indeed are the two questions of slope and fertility that the system of land taxation takes into account the degree of slope and the depth and fertility of the soil in assessing tax liability. A further fact considered is the distance of the plot from the village, another reflection of the lack of arable land.

This lack, together with the practice of equal inheritance, has resulted in great subdivision of holdings. Statistics published in 1939 gave the following figures:

	Number of Holdings comprising			
Commune	<1 *hectare*	1·01–5 *hectares*	5·01–10 *hectares*	*Over* 10
Finhaut	15	43	1	0
Salvan	88	108	2	0

More disadvantageous still is the fragmentation of these holdings. It was found that amongst the peasants of Le Trétien, one person might own as many as 90 separate plots although the total area only amounted to between 1 and 2 hectares. In these circumstances it is important not to waste land in boundary marking. Plots are delimited by twigs standing at their corners with stones buried below as an enduring record. The drawbacks to fragmentation are obvious and some attempts are being made to consolidate holdings in the meadowland at Planajeur above Les Marécottes. Lack of machinery is another result of poverty. The first plough, it was learnt, was acquired by the commune of Salvan in 1949. Apart from this, cropland is dug with a pronged implement carrying curved teeth, reaping is done with a sickle and threshing with a flail.

Arable lands lie chiefly around the left-bank villages at a height varying between 900 and 1,100 metres on the second terrace and between 1,200 and 1,300 metres round Finhaut on the third. The best soils are found in an old lake bed south of Salvan. Here are grown vegetables such as potatoes, onions, leeks, carrots, peas, beans, lettuce and celery. Cultivation has also been extended up the steep mountain side above the villages by means of terracing and the patchwork of crops includes rye, lucerne, vetch and strawberries as well as vegetables. For the most part the crops are for subsistence but strawberry growing is now a commercial undertaking round all the four west-bank villages. The sunny well-drained slopes provide good physical conditions but equally important is the railway which carries the fruit to Martigny for distribution to Basle, Zurich etc. Fruit trees are scattered here and there but little attention is given to them and there are no longer any vineyards. Of the cereals rye only is still grown.

Generally speaking Alpine valleys are better suited to pastoral than to arable farming. This is true of the Trient Valley. But, unfortunately, owing partly to the nature of the hard crystalline rocks and partly to the results of erosion, there are no extensive grazing lands on the mountain side above the villages. Mayen pastures are confined therefore to terrace fragments. On the western side of the valley, mayens are found at heights varying between 1,250 and 1,400 metres (Fig. 4), differences in altitude which make for differences in accessibility. The result is a certain variety in the details of transhumance. From Les Marécottes, for example, cattle are driven to Planajeur, 150 metres above, at the beginning of June and peasants visit the mayen twice a day for milking. About June 10th the herd climbs another 400 metres to La Creusa. Here the herdsmen remain with the animals and so there are temporary dwellings as well as hay barns at La Creusa. The slopes of Mont de l'Arpille also possess mayens on terrace fragments one of which, La Tailla, lies at a lower level than Salvan where its owners live.

Above the mayens the summer pastures or alpes illustrate in their distribution some of the differences between Mont de l'Arpille and the massif des Aiguilles Rouges. The name "Arpille" is derived from "Alpille" or "Little Alpe" and the whole of the gentle upper slopes at the southern end of the mountain provide summer grazing. On the opposite side of the valley precipitous slopes rise above the forest; pastures can only be found at the head of tributary valleys which dissect the massif. Salvan possesses the alpe of Emaney at the head of the Triège; Finhaut sends its herds to Fenestral and to Emosson in the Barberine valley.

As is usual in the Valais, the organization of transhumance is an affair of the commune and is regulated by the Consortage, the group of peasants possessing grazing rights. One of the former tasks performed by the Consortage of Salvan, the choice from amongst its members of individuals to do herding at the alpe, has recently been modified. No longer do local men serve as herdsmen, for higher wages have attracted them to Martigny and elsewhere. At Emaney it was found that the cattle were tended by men from Val d'Hérens where over-population has given rise to a seasonal migration of labour.

In 1951 there were 90 cattle grazing at this alpe. Its difficulty of access no doubt accounts for the fact that nearly all the milk is made into butter and cheese while the hotels in the villages are supplied with milk from the Rhône valley. Goats provide milk for the peasants and a herd from each village makes a daily migration to mountain pastures. Sheep have declined greatly in numbers since the nineteenth century but the commune of Finhaut still possesses a flock which grazes in the Barberine basin. A new development in pastoral farming has taken place on Mont de l'Arpille where the alpe of Charravex is now privately owned by a butcher in Salvan. From this remote ledge, milk travels across the gorge in churns by cable and supplies the hotels. In general it seems that pastoral farming has experienced less change than arable as a result of the growth of communications.

Most of the forests are communal property. Lumbering, widespread in earlier centuries, is now confined to the gorge and to the slopes of Mont de l'Arpille. Formerly logs were floated down the Trient but the making of a cart-track down to Le Gueroz and of cable ways across the gorge to Salvan now allows more convenient transport. Two small sawmills, one at Finhaut, the other at Salvan, cut up the softwood into planks for local use.

The quarrying of slates from the Carboniferous schists was once an important occupation and many of the late nineteenth and early twentieth century buildings are roofed with these rough slates. But, latterly, quarrying has ceased owing to the high cost of labour. Galvanized iron is now replacing slates as they formerly replaced shingles.

The tourist industry of the Trient basin dates from the middle of the nineteenth century when a mule track was made from Vernayaz to Le Châtelard. The chief difficulty on the route was the 1,500 feet cliff between the Rhône valley and Salvan; the road scales this by means of 52 hairpin bends. But the main stimulus resulted from the building of the railway up the valley. The Martigny-Châtelard line, completed in 1906 and extended in 1908 to Chamonix, assisted a tourist boom. The peak year for railway traffic was 1911 and it is interesting to note that, at this time, about 80 per cent of the visitors travelling on the line were English. The first world war brought a setback from which the tourist industry has never recovered. The lack of a motor road has, in recent years, been a disadvantage which has been partially remedied by the making in 1932 of a second class highway from Martigny to Salvan. This has brought numbers of

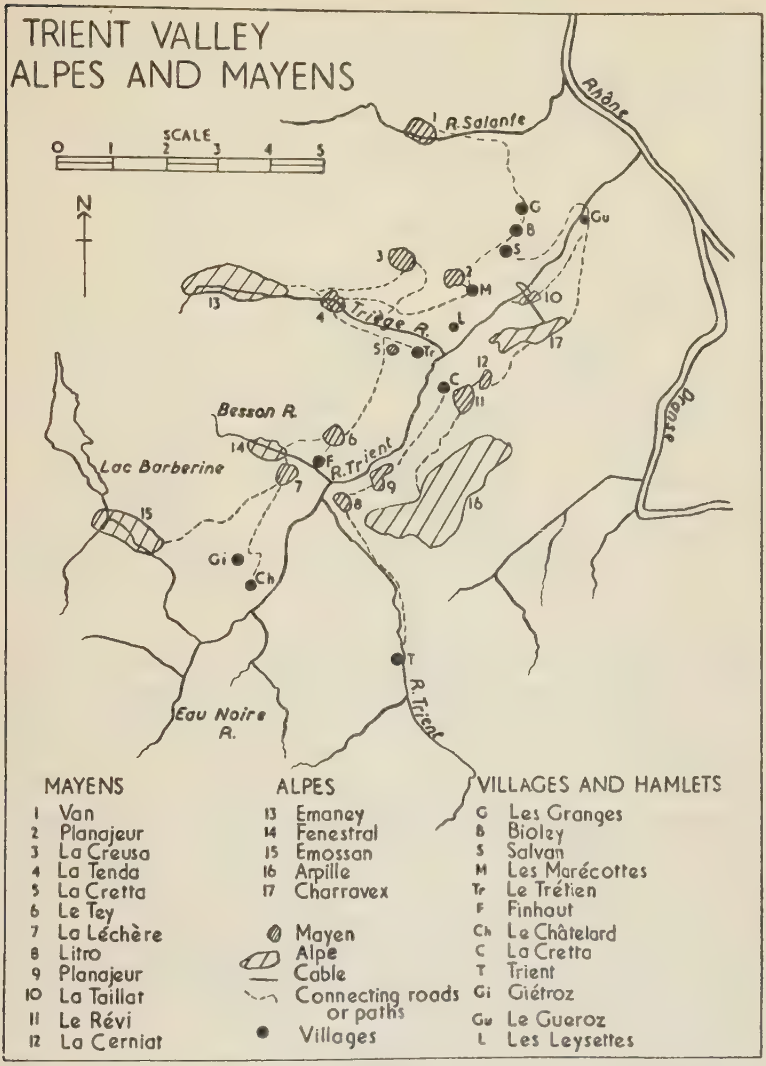

Fig. 4.

Swiss visitors to the hotels at the lower end of the valley and has also stimulated the conversion of barns into weekend châlets. But Finhaut is still inaccessible by car and a number of its hotels have been adapted to other uses.

Today the tourist industry, though no longer as flourishing as in former years, remains the chief commercial activity within the Trient Valley. It does not compare in scale with Zermatt, but if hotel accommodation may be taken as an index, the tourist industry is at least as important as in the Val d'Anniviers or Val d'Hérens. Another characteristic is that almost all tourist developments have taken place on the western side of the valley owing to the ruggedness of Mont de

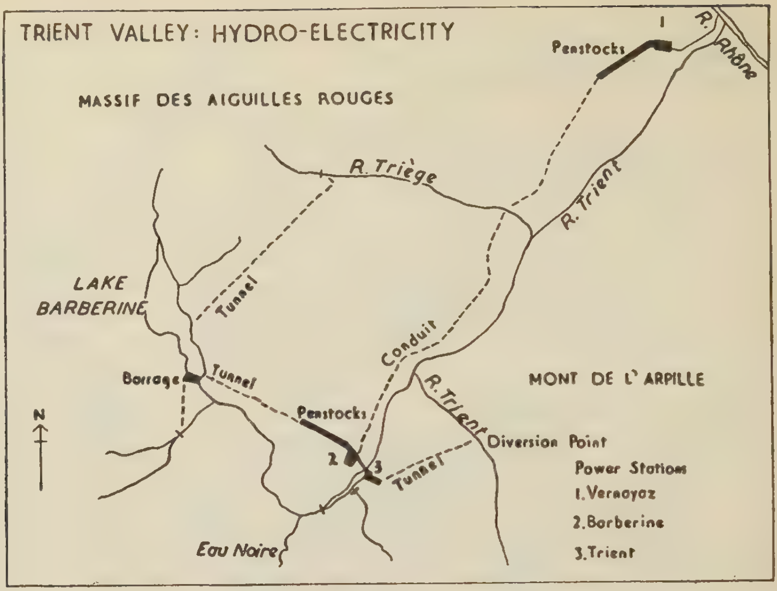

Fig. 5.

l'Arpille. Further it is noticeable that there is a dispersal of hotels amongst the three principal west-bank villages, showing that tourism has been a stimulus to all the main settlements and not to one only, as at Zermatt.

Undoubtedly the greatest single resource of the Trient basin is its water power (Fig. 5). This has been developed to provide electricity for the Swiss railways, the Trient Valley power stations supplying 285 million kilowatt hours out of the 900 million consumed by the Swiss railways in 1948, i.e., 32 per cent. Most of the water power of the basin comes from the Aiguilles Rouges massif where heavy rain and snows provide abundant water in late spring and early summer but insufficient in autumn and winter. The need to conserve water has been met by damming the Barberine river.

Since its power stations only supply the Swiss railways, the domestic requirements of the Trient Valley come from the neighbouring Salanfe valley whose waters are utilized at a power station below the Pissevache Falls. A project on the upper Salanfe, involving the flooding of an old lake basin, will increase power supplies.

Fig. 6 illustrates trends in population. Canton Valais, despite a much smaller degree of industrialization than has taken place on the Swiss plateau, shows an increase in population between 1850 and 1950 of 95 per cent. The St. Maurice district in which lie the communes of Finhaut and Salvan, increased by 38 per cent in the same period. But communal statistics show that the main rise, as might be expected, has occurred in the towns of the Rhône valley, St. Maurice showing an increase of 122 per cent and Martigny of 227 per cent. In the

Trient Valley population has just held its own.* Finhaut's population in 1950 was 4·7 per cent more than that of 1850. The commune of Salvan which was separated from Vernayaz in 1912, increased 6 per cent between 1920 and 1950. The stagnation appears the more clearly when contrasted with the growth of population in more popular valleys. Zermatt has grown from 369 to 1,395 between 1850 and 1950, Saas Fee from 233 to 504.

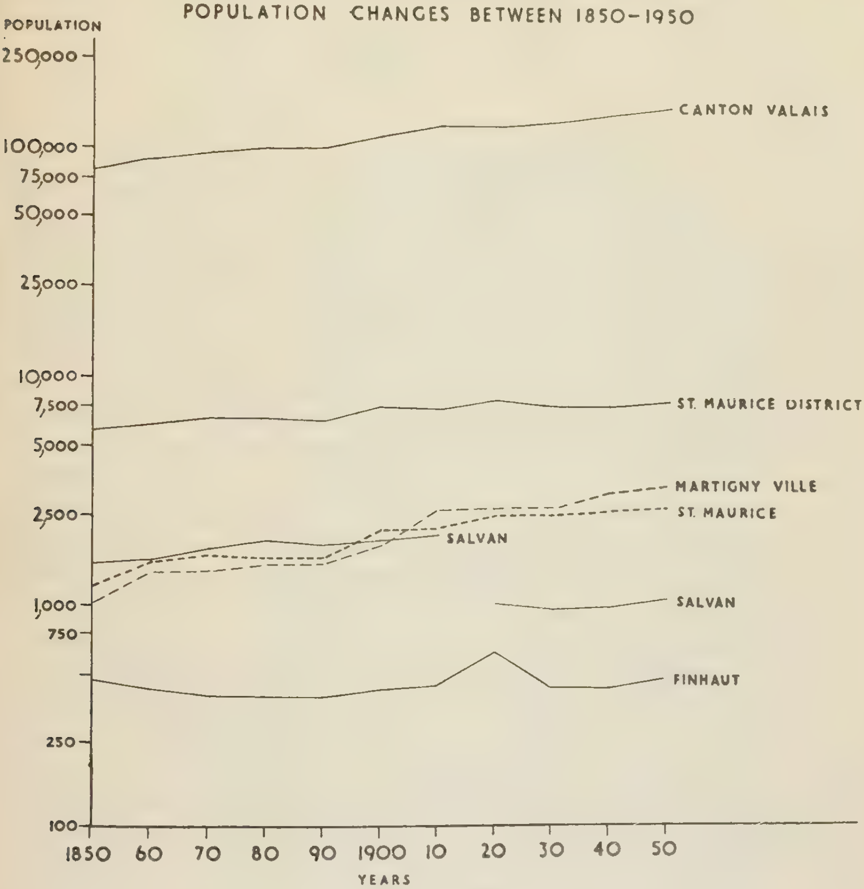

Fig. 6.

Indeed the future for the Trient Valley is not rosy. There has been a decline in traffic on the railway in recent years and the plan to convert the Martigny–Forclaz Pass–Vallorcine road to Chamonix into an international highway is viewed with apprehension as potentially a too powerful rival. Finally agriculture, which provides such a meagre return for so prodigal an effort, is unlikely to retain its attraction for people who have become wage earners in the Rhône valley.

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* The communes of Finhaut and Salvan cover the area to the west of the river and therefore include all the principal settlements.

Railway Geography in a Secondary Modern School

E. A. COURSE

In 1947[1] the late Mr. James Fairgrieve wrote a letter to *Geography* in which he described one way in which a teacher in an urban area was meeting the difficulty of obtaining suitable material and finding a topic for local studies. Another possible answer was attempted in an experiment carried out in a secondary modern school in the East End of London, in which it was found possible to exploit the normal interest of boys in railways. This was used as a basis for the study, not only of the local environment, but also to illustrate important ideas and principles of economic and historical geography. The railways were studied from two points of view. Firstly, we considered them as part of the landscape, and attempted to understand the way in which the local railway system had come to assume its present appearance. Secondly, we concerned ourselves with the way in which the railways worked and tried to make some assessment of the part they played in the life of the East End. We also compared them with underground electric railways and with road transport services.

The "railway landscape" approach involved a study of the nature and history of the fixed capital equipment used by the railways and a consideration of its impact on the East London scene. The boys thought about railways largely in terms of trains and had to be persuaded that such things as the permanent way, the stations and the goods depots were also fundamental parts of the railway system. It was readily apparent that the flat terrain of Poplar (in which the school was situated) could have had little influence on the alignments of the railways and examination of the plans and profiles showed that virtually all the dips and turns of the lines reflected human influences. The point was made, however, that this was exceptional. Places where the rail pattern was much influenced by the physique of the land were mentioned, e.g., the Peak District, and the London to Brighton line was chosen to illustrate the way in which railway profiles may reflect land forms (see Fig. 1). With regard to sources of profiles, those of the main lines have been published;[2] for local lines it may be possible to coax the necessary information from the railway authorities. Signal boxes sometimes contain records of the gradients on their respective sections, whilst the Engineering Departments have profiles

➤ Mr. Course is a research student at the London School of Economics and lectures on railway geography for the Department of Extra-Mural Studies University of London. His article is based on teaching experience in secondary modern schools in London between 1947 and 1951.

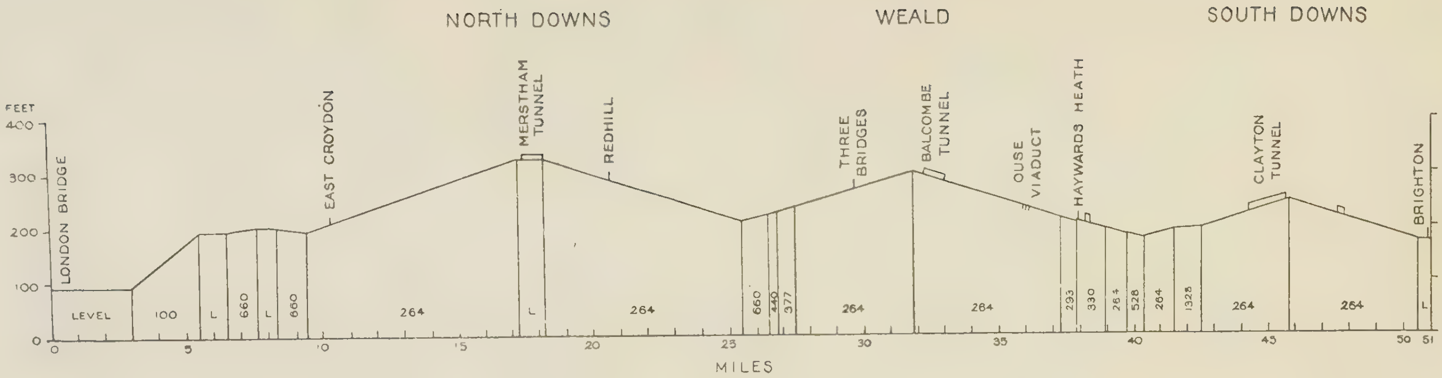

Fig. 1.—Profile of the London to Brighton Railway, showing the influence of the Downs and the Weald. The ruling gradient of 1 in 264 is not fortuitous but, according to Sir John Rennie, the engineer, should exactly double the resistance of the trains. In order to maintain it, heavy engineering works, including tunnels at all three summits, were required; local lines—and later main lines—follow the ground more closely. (The 1 in 100 of New Cross Bank was, of course, on the London and Croydon, and not on the original London and Brighton Railway.)

for every line. If necessary, however, the teacher can construct his own profiles by consulting the lineside gradient posts which are usually provided. We found that in Poplar the railways normally run either in cuttings, or on arches, to avoid interference with the close network of roads, and that their gradients are not *directly* influenced by the terrain. Three "primary" lines could be distinguished from the branches and connecting lines which were subsequently added. These are parts of (1) the Eastern Counties—later G.E.R.— main line of 1839, (2) the London and Blackwall of 1840, and (3) the North London lines of 1850 and 1852. (See Fig. 2). The "primary" lines had alignments influenced mainly by the provenance and destinations of their prospective traffic and in two cases were oriented towards the river and docks. Later lines filled in gaps in the East London rail network and their sitings depended largely on the positions of the earlier, "primary" lines. The boys drew a series of maps depicting the lines at various key dates, and, I believe, were able to see that the present layout hardly made sense without a knowledge of its history.[3] Not only was it necessary to know the order in which the lines were built, but also something of railway political history (see Fig. 2). (The relations between the G.E.R. and L.T.S.R. are an important factor in Poplar railway history.) They could also see that the lines were not laid down to carry local traffic, but were designed to carry goods and passengers *through* Poplar rather than within it. Although not so extreme a case as a small village which happens to be on a main line railway, Poplar is still, to a considerable extent, a zone of passage in which goods are transferred between land and water transport. A consignment of rubber from Malaya to Birmingham or a passenger journey from London to Southend both involve the employment of a railway signalman in Poplar. All this helped to impress on the boys the way in which Poplar was involved, not only with the rest of Britain, but also with the rest of the world.

Fig. 2.—Railway lines in Poplar and district.

I. Eastern Counties Railway to Colchester, 18th June, 1839.
II. London and Blackwall Railway, 6th July, 1840.
III. Eastern Counties and Thames Junction Railway, 29th April, 1846.
IV. London and Blackwall, Stepney to Bow Junction, 2nd April, 1849.
V. North London Railway[a] to Bow (running powers to Fenchurch Street via Stepney), 26th September, 1850.
VI. North London Railway[a] to Poplar, 1st January, 1852.
VII. North London Railway,[a] Victoria Park–Stratford, 16th October, 1854.
VIII. London, Tilbury and Southend Railway to Barking, 31st March, 1858.
IX. London and India Docks Company; Millwall Docks Company; and Great Eastern Railway. To Millwall Docks, 18th December, 1871. To North Greenwich, 29th July, 1872.
X. Whitechapel and Bow Railway (L.T.S.R. and Metropolitan District Joint), 2nd June, 1902.
XI. London Transport (Central Line) to Stratford, 14th December, 1946. (This line runs in tubes, parts being under the former Eastern Counties and the former Whitechapel and Bow.)

[a] East and West India Docks and Birmingham Junction Railway until 1st January, 1853.

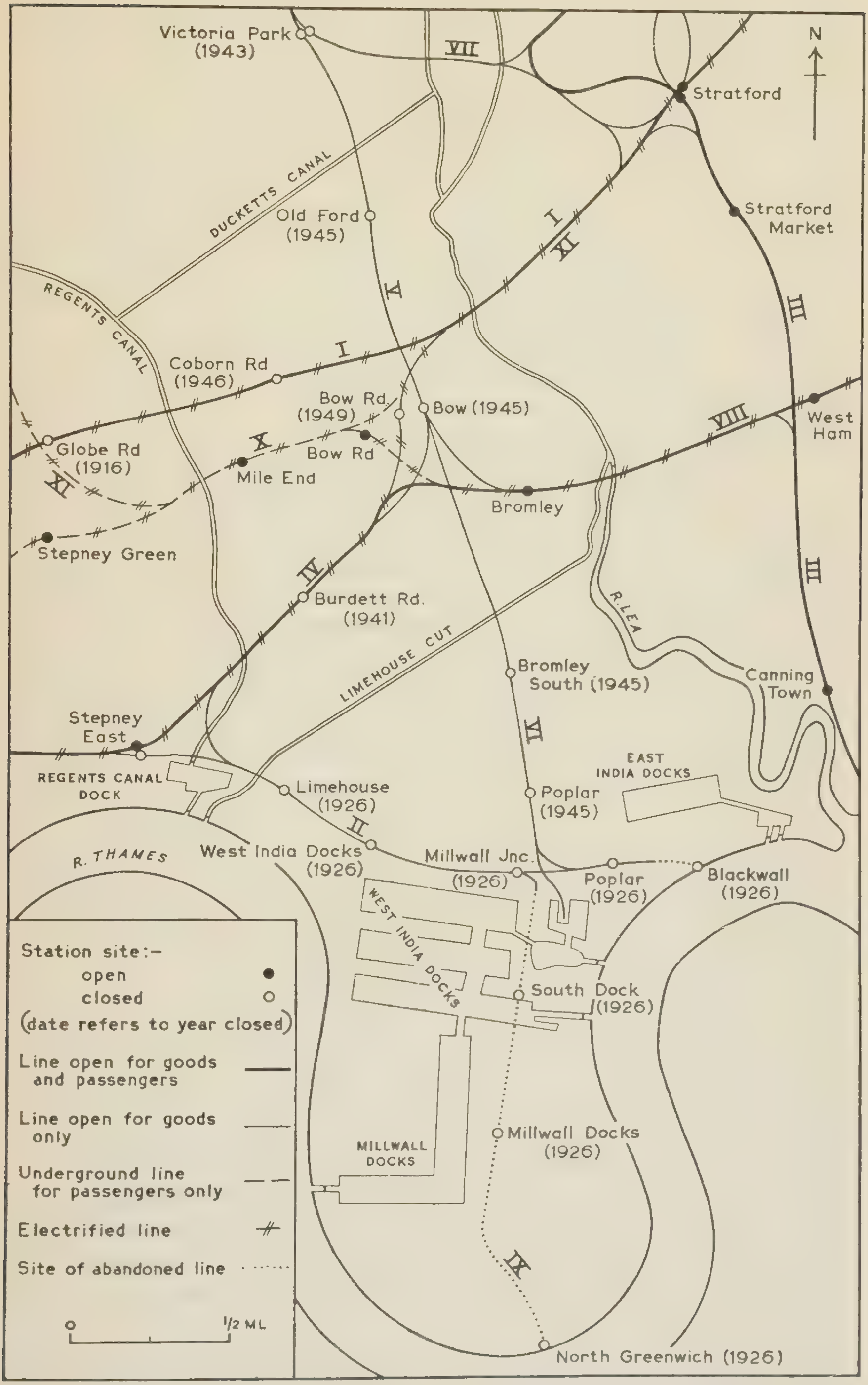
Victoria Park (1943)
VII
Stratford
N
DUCKETTS CANAL
Old Ford (1945)
I
XI
Stratford Market
REGENTS CANAL
V
III
Coborn Rd (1946)
I
Bow Rd (1949)
Bow (1945)
VIII
West Ham
X
Globe Rd (1916)
Bow Rd
XI
Mile End
Bromley
Stepney Green
IV
R. LEA
Burdett Rd. (1941)
LIMEHOUSE CUT
Bromley South (1945)
Canning Town
VI
III
Stepney East
EAST INDIA DOCKS
REGENTS CANAL DOCK
Limehouse (1926)
Poplar (1945)
II
R. THAMES
West India Docks (1926)
Millwall Jnc. (1926)
Poplar (1926)
Blackwall (1926)
WEST INDIA DOCKS
South Dock (1926)
Station site:-
open ●
closed ○
(date refers to year closed)
Line open for goods and passengers
Line open for goods only
Underground line for passengers only
Electrified line
Site of abandoned line
MILLWALL DOCKS
Millwall Docks (1926)
IX
0
1/2 ML
North Greenwich (1926)

Fig. 2.

After thinking about the siting of the East London lines, we next considered the stations; those in use, those of which the buildings survive but are no longer used for passengers and those which have virtually disappeared. An attempt was made to impress on the boys that each building represented thought and work, carried out in a setting of social arrangements and technical equipment now past. They reflect the ideas of directors and of engineers; they show the outcome of their decisions about potential traffic and often—notably in the case of Bow Station—reveal something of their aesthetic values. (This approach to buildings as monuments need not, of course, be confined to railway stations.) The boys were both impressed and curious at the number of stations which had been closed. They consulted their parents or grandparents, who gave glowing accounts of thriving stations in "the good old days," when they were young.

It was explained that this change in the capital equipment of the railways, i.e., the closing of stations, arose from the development of alternative transport techniques. Motor buses could move local passenger traffic more cheaply and effectively and, therefore, the stations, and the trains which served them, were no longer required. With a suitable class this situation might provide an introduction for some very informal basic economics. However, as we were mainly concerned with railways, we left the question of road and rail competition in order to study the underground system, especially that part of it which runs through the Borough of Poplar. It was considered as a technical development, with its highly specialized permanent way traversing urban areas in a distinctive manner, and being especially suited to carry an intensive passenger traffic. I found a danger here of being side-tracked on to the more technical aspects of railway equipment. I feel that such topics as the intricate mechanism of automatic signals are best left to the science master and it is sufficient for the geographer to know that such things do exist and may increase the carrying capacity of lines on which they are installed. However, this did provide a good introduction to the relationship between transport facilities and the distribution of population. The boys were able to draw diagrams showing where any ten people they knew worked and the method of transport they used. They found that, for many people, Poplar provided home and not work, but for even more people it was a workplace but not a home. The part played by the railways, however, in effecting this transfer of the day and night population, did not appear to be so large as we had expected. Apart from its effect on the distribution of population, the underground railway was used to illustrate one other point—namely, the varying impact on the landscape of different transport techniques. The underground, virtually invisible at the surface but for its stations, was compared with the long arcades of the steam lines, strung out across the Borough, overtopping all but the tallest of buildings.

These, then, are some of the points illustrated by the railway "landscape." Like all landscapes it is ever-changing, but compared with the flow of traffic, such change as the decay of a station is but very slow (although it is perhaps unnecessary to remind the reader that the Poplar landscape, including its stations and goods depots, between 1940 and 1945 was being changed with dreadful rapidity). We left the evolutionary, "landscape" approach to railways, and concentrated on them as a working machine. I must confess that the boys were more interested in the trains of Poplar than in the railway layout or the stations. We started off with a shed visit and the siting of locomotive depots certainly offered some interesting geographical material. We found them placed at strategic points, not always of the present system, but of that contemporary with the building of the depots. In some cases the availability or the prior possession of suitable land was an important factor, but this was not the case in the depots which we studied. The complicated rosters prepared for locomotives and their crews illustrated the economic principle of the optimum use of capital equipment and labour. However, the great feature of the shed visit turned out to be the collection of engine numbers and it did prove possible to turn this to some account. Some of the boys had printed lists of the locomotives arranged in classes and, for each class, a number of details, including the date of the design, were given. This gave scope for historical association. It was possible, for instance, to describe some engines as having been built during the depression of the thirties, others as having been running during the 1914 war, and a select few as being old enough to have been in steam when Mafeking was relieved.

More useful teaching material, however, is provided by the traffic which flows along the lines, although I must confess that in some ways road transport provides more easily accessible information than do the railways. For instance, when a hold-up at the West India Dock gate precipitated a queue of lorries about a mile in length, the boys were able to ask each of the waiting drivers what they were carrying and where they were from—a technique not easily applied to railway trains! In some cases the drivers had also stated for where their consignment was bound and this enabled the boys to make maps showing Poplar as a link in international communications. Returning to railways, the flow of passenger traffic can be inferred fairly well from the public timetable. Usually, the teacher will have to copy out the relevant parts of Bradshaw, which can then be retailed to the class. A study of timetables as such will, of course, involve mathematics, especially if such things as average speeds and frequencies are to be considered. It is of interest to compare the current Bradshaw with those of, for instance, 1931, 1921 and 1911, to see if there have been any significant changes in the flow of passenger traffic. The inspection of timetables may be supplemented by direct observation in order to compare the number and type of coaches in the different trains; this indicates very roughly the number of passengers travelling at different times and how far they are going. Information about goods traffic is far more difficult to acquire, especially where it reaches such volume and variety as that passing through Poplar. Direct observation is not very helpful, because a considerable number of the goods trains run at night. Moreover, the goods are usually covered over and the destinations marked on the wagons are difficult to record. In fact there is little chance of getting very far without the help of railway officials. In smaller places, stationmasters or goods agents will sometimes give information about their "imports and exports," but in general the railways are loath to provide detailed goods traffic statistics for individual lines. However, if a teacher should be successful in getting this information, then it will provide admirable material for maps showing the linkage of the district with other parts of the country. The types of produce which the district imports and exports may be noted, and also the "hinterland" of the local goods depot.

These are some of the ways in which I have used railways in teaching. The details of presentation are, perhaps, best left to the individual teacher, but it seems clear that maps and diagrams, and observation by the children, are essential components of any scheme of work. A study of railways will not replace the essential elementary history and geography, but it will provide a valuable complement in so far as it illustrates the links between past and present, and shows the delicate connections between man and his natural environment which are reflected in the cultural landscape. And, not of less importance, it may suggest, in some small degree, a richness in the environment of a boy which had not before been suspected.

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This Changing World

EDITED BY L. S. SUGGATE

INTER-COUNTY MIGRATION IN SOUTH-EASTERN ENGLAND, 1951

The publication of birth-place statistics relating to persons enumerated at the 1951 census enables the calculation of net movements of population from county of birth to county of enumeration. The county of London and the six neighbouring counties of Essex, Hertford, Kent, Middlesex, Surrey and Sussex, which together broadly correspond to the official London and South Eastern Standard Region—which excludes, however, those parts of Essex and Hertford lying beyond the Greater London conurbation—form the first compact regional group for which county census volumes have so far been published.

Though the population of London (county) has been falling steadily since 1901, owing to suburban growth, the rate of decrease became more rapid in the 1930s, and evacuation during the recent war led to an even more marked decline, only about half of which has been offset by the postwar increase. In fact, the overall reduction between 1939 and 1951 (665,000) was greater than that between 1901 and 1939 (523,000). This decrease is reflected in the accompanying table, which shows that migration in recent decades resulted in a net loss of nearly 1,700,000 persons from London to the other counties in the group, with Essex, Middlesex and Surrey showing the largest intakes. The table also shows the net movements occurring amongst the other counties: it will be seen, for instance, that Essex lost to, and Sussex gained from, each of the other five, two-fifths of the total gain by Sussex originating from Essex. The latter county contains old suburban areas immediately beyond the L.C.C. limits, including East Ham and West Ham, which have declined since 1931, as well as an outer zone of more recent expansion. The smaller loss from London to Kent than to the other contiguous counties probably results from the fact that Essex and Surrey contain a higher proportion of the population of Greater London and also have a higher proportion of their total population living within Greater London. Middlesex is entirely within the Greater London area.

Net gains (+) from or net losses (−) to:—

County	*Essex*	*Herts.*	*Kent*	*Middx.*	*Surrey*	*Sussex*	*Total*	*London*	*Total*
Essex	—	−4,873	−11,390	−11,890	−19,856	−10,072	−58,081	+430,971	+372,890
Hertford	+4,873	—	+2,156	+4,823	−693	−1,306	+9,853	+68,439	+78,292
Kent	+11,390	−2,156	—	−7,568	−12,860	−6,180	−17,374	+185,366	+167,992
Middx.	+11,890	−4,823	+7,568	—	−7,764	−5,133	+1,738	+605,793	+607,531
Surrey	+19,856	+693	+12,860	+7,764	—	−3,189	+37,984	+304,080	+342,064
Sussex	+10,072	+1,306	+6,180	+5,133	+3,189	—	+25,880	+96,195	+122,075
London	−430,971	−68,439	−185,366	−605,793	−304,080	−96,195	−1,690,844	—	−1,690,844

The outward movement of population from the county of London also affected Buckinghamshire, which experienced a net gain of 26,000, and it seems reasonable to assume that the county reports for Berkshire and Bedfordshire will also show net gains. On the other hand, London obtained slight compensation in the form of inward balances from certain populous industrialized counties which were affected by economic depression in the inter-war period, such as Durham (19,400), Glamorgan (15,900) and Lancashire (9,600). These net gains were, however, exceeded by some of the gains from these counties to Essex, Hertford, Kent, Middlesex, Surrey and Sussex. The position may be summarized by saying that London and the south-eastern counties gained, on balance, 133,300 persons from Durham and Northumberland, 111,200 from Glamorgan and Monmouth, and 104,600 from Lancashire.

University of Edinburgh R. H. OSBORNE.

THE TWO EUROPES IN AGRICULTURE

The secretariats of the Economic Commission for Europe and the Food and Agriculture Organization place the agricultural economic geographer in their debt with their joint study entitled *European Agriculture: A Statement of Problems*. From the wealth of detail here provided in relatively small compass there emerges again the familiar picture of "the two Europes." An analysis of this material should go far to aid the student in assessing the impact of broad economic trends on regional development.

In north-western Europe (as to an even greater extent in the U.S.A.) industrialization has enabled a larger population to enjoy a food supply better both in quantity and quality than 70 years ago despite the decline in the proportion of population engaged in agriculture to 19 per cent. In these countries the proportion of agricultural production grown at home has become a matter of policy rather than necessity. While cereals, textile fibres and vegetable oils are largely imported, animal products, vegetables, fruit and sugar-beet grown on labour-intensive small farms are generally protected and profit by the higher living standards in urban areas. Nevertheless, in most of these countries, over a relatively large area, the small farms have been amalgamated into larger units, a change associated with the movement of farm population to industry and accelerated in the pre-war decade. Capital investment is high in relation to unit area, a feature associated with the specialized animal production. Nevertheless there is still scope for raising unit-yields to Danish standards.

In contrast we find the countries of southern and eastern Europe, with half to three-quarters of their population still engaged in agriculture and the absolute numbers still increasing: such countries grow three-quarters or more of their cereal requirements and are extending these crops on to unsuitable areas to meet the needs of a more rapidly growing population: they are unable to rely on exports of manufactures for the purchase of their basic requirements. In many regions the limit to unit-yields is climatic. Capital per unit area is low, there are few cattle or soil-enriching crops and artificial fertilizers are little used save for special crops like tobacco and on the more advanced farms. In the particularly favoured areas specialization on labour-intensive crops—horticulture, vines, tobacco—is possible. Scarcity of non-agricultural opportunities and consequent pressure on the land means that farms are small, split by inheritance, sale or government redistribution. Low industrialization means lack of the incentives to modernization that operate in the northwest. The trade restrictions of the thirties, a setback to specialized export crops and to animal production, accentuated their monoculture and agricultural overpopulation.

Desire for security against war or unfavourable terms of trade or against disturbance of the present agricultural structure has led to the paradox of diminishing trade in agricultural products while trade in industrial products increases, though the greater dependence of agriculture on varied physical conditions might lead to the contrary supposition. In particular, stronger protection of labour-intensive products and improvements in fodder production have led to a decline in imports of meat, coarse grains and oilcake into Europe (excluding U.K.). Over Europe as a whole there is a long-term trend toward more intensive crops and in the upland areas to a substitution of extensive livestock production and timber for grain.

The highest unit-yields, both per man and per unit area, are in the more industrialized countries and the gap between high and low productivity countries is increasing. At the same time, regional differences in unit-yields within some countries are as great as the differences between countries.

University of Edinburgh. C. J. Robertson

RECENT RAILWAY DEVELOPMENTS IN THE GOLD COAST

Motor transport has brought about revolutionary changes in tropical countries, but it has not yet proved a complete substitute for the railway on important trunk routes. Nowhere is this better illustrated than in the Gold Coast. Here, rapid as was the economic expansion between the wars, the tempo increased during and after the last war to such an extent that in spite of improvements to roads and an increase in numbers of vehicles licensed, railway development is also proceeding apace.

In 1939 there were 490 miles of metre gauge line and there had been no construction for the previous decade. But during the war some large deposits of bauxite were opened up at Awaso and the workings connected with the Kumasi-Takoradi line by a 46-mile branch. The cost was borne by the U.K. Ministry of Supply and the line handed over to the Gold Coast Railway in 1949. Usually two daily trains are needed for the bauxite and another for general goods and passengers. South of Nsuta the same route is used for manganese exports (over 750,000 tons annually) and for three or four daily train loads of timber and a large number of passenger and general freight trains. The resulting congestion was driving much timber traffic on to roads unfit for heavy lorries. The 33 miles between Tarkwa, the largest gold mining centre, and Takoradi Junction were therefore doubled between 1950 and 1953. It is illustrative of economic progress in the Gold Coast that this is the only stretch of any length to have been doubled in inter-tropical Africa.

At present there is no direct link between Accra and Takoradi, though the Kade branch comes within 30 miles of the Kumasi-Accra line. The 1950 Development Plan envisaged the closing of this gap. After survey, work was started in 1953 on the new link from Achiasi, 117 miles from Takoradi, to Kotoku, 19½ miles north of Accra. Construction will take three years and is to be financed by E.C.A. The upper basin of the Birim river is the principal diamond area and the source of much timber. (See Fig. 6 on p. 15 of this issue).

Congestion at the port of Takoradi has not only been the cause of setbacks to the development programme, but of monetary inflation due to physical limitations on imports of consumer goods. It has therefore been decided to proceed with the new deep-water port that formed part of the Volta Scheme, whether the latter came to fruition or not. A site was selected at Tema, 15½ miles east of Accra, and this has since been linked with the Accra-Kumasi railway by a 16½-mile branch from Achimota. An extension runs inland for 18½ miles across the Accra Plains to an inselberg, the Shai Hills, which will be quarried for material to be used in the construction of moles and wharves.

Should the Volta Scheme be carried through, a further programme of railway construction will be necessary to connect the bauxite deposits at Yenahin with the main line at Kumasi, 40 miles away. It will also be necessary to connect the Accra-Kumasi line with the smelter at Kpong. In turn the latter will be linked with Tema by a 12-mile extension from the Shai Hills. This will enable a million tons of bauxite to move to the smelter annually and 200,000 tons of aluminium to be exported.

Finally a survey has been made of a 100-mile extension from Awaso to Berekum through the cocoa area of Western Ashanti. New construction thus reflects the general development of the country and, though the transport of minerals is the main object, it is not the only one. It should be noted that any extension northwards from Kumasi has been postponed indefinitely. Commercial production is still largely confined to the forest belt.

Traffic has greatly increased since 1939, freight from 1·06 to 1·86 million tons and passengers from 3·4 to 6·4 millions. The main items of freight traffic correspond with those entering overseas trade in bulk. In 1952 export traffic included manganese, 883,000 tons; timber, 278,000; cocoa, 159,000 (total crop 237,000); and bauxite, 137,000. Import traffic included 110,000 tons of machinery, metal goods and cement, and 107,000 tons of oil and petrol.

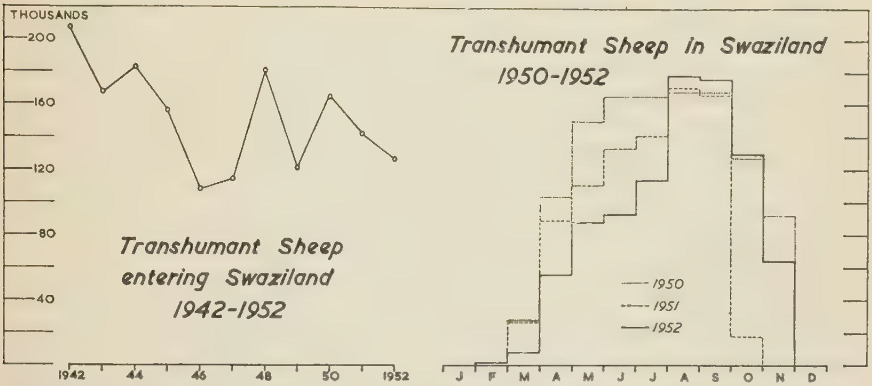
A new departure will be the use of diesel traction, at present on order. Its advantages are connected with the more regular imports of oil than of coal, the use of which leads to great damage to boilers from the highly-mineralized water that must be used. Disadvantages are the high capital costs and the lack of skilled maintenance workers.

University College of the Gold Coast. H. P. White

TRANSHUMANCE BETWEEN THE TRANSVAAL AND SWAZILAND

The seasonal movement of sheep between the eastern Transvaal and western Swaziland provides a significant example of inverse transhumance. Each autumn for more than half a century, Merino sheep have migrated from the Ermelo district eastward to generally lower-lying areas in search of winter pastures. Trekking, as this movement is called locally, has also enabled the flocks to lose their parasites, for the change to fresh, uninfested pastures lessens the chance of re-infestation and builds up the sheep's resistance. Without this control of parasites, the practice of spring lambing, which gives substantially higher percentages than autumn lambing, would be impossible.

Transhumance has, however, involved the burning of "sour veld"—the tall dry grass of late summer which is a valuable cattle feed but unpalatable to sheep—in order to furnish a growth of short, green grass. Veld burning, together with the Merino's peculiar habit of selectively overgrazing the more nutritious species and ignoring the less palatable, has accelerated soil erosion at the onset of heavy spring rains. Since these extensive winter pastures are situated in the upper catchment areas of Swaziland's principal rivers, such a system of land use constitutes a grave threat to the main ranching areas of the territory, located as they are in the semi-arid bushveld and vitally dependent on surface drainage for water supply. There is in fact abundant evidence of recent silting in perennial rivers, some of which are reduced in the dry season to sandy creeks.



Transhumance is, however, waning. Dependable estimates place the movement during the early thirties at more than 250,000 sheep annually (one authority gives 400,000), but by 1942, when official statistics became available, it had fallen to 206,406. Since then, despite a temporary recovery after 1947 stimulated by high wool prices, the decline has continued. In 1952, only 126,201 sheep entered Swaziland (107,852 in 1946), though as a result of early spring lambing the outward movement totalled 178,231.

This overall decline is symptomatic of far-reaching changes in local European farming economies. Among the varied and complex factors responsible for the decline may be cited the problems peculiar to Merino-sheep farming, problems of low-fertility soils and pest control. But far more significant have been the decreases in carrying capacity of the winter veld attributable to selective overgrazing and to the spread of unpalatable grass species, the fencing of road-side farms along trek routes both in the Union and in Swaziland, and, especially, the development in the Transvaal of more diversified, more intensive systems of farming based on the growing of cash crops and the production of feed for cattle.

Merino sheep numbers in the Ermelo district have fallen substantially. As yet, however, the drop in numbers has not been accompanied by a marked increase in woolled-mutton sheep, destined perhaps, because of greater productivity, to replace Merinos throughout the high-rainfall grassveld areas of South Africa. Nor has there been a marked increase in the numbers of cattle, which have been shown by recent grazing experiments in the eastern Transvaal to be essential to successful sheep farming in grassveld areas. But the trend towards cattle and woolled-mutton sheep in association with crop production is none the less discernible.

In Swaziland the release of winter grazings has permitted the afforestation of more than 100,000 acres, providing thereby not only a renewable resource in place of a wasting asset but also an improvement in the water supplies for the ranching activities of the low veld. But there are still some 800,000 acres used, or rather misused, as winter grazings, and although veld burning is now being regulated if not prohibited, the future prosperity of European farming both in Swaziland and the eastern Transvaal would seem to rest, in part, on a continued decline in transhumance.

University of Tasmania PETER SCOTT
(Formerly of Cape Town)

THE EXPANSION OF THE CANADIAN ALUMINIUM INDUSTRY

The expansion of the Aluminum Company of Canada (Alcan) was briefly referred to by Dr. Watson in his article on "The Pattern of Canada's Post-War Growth," in the July, 1954, number of *Geography*. This company is the sole producer of aluminium ingots in Canada. Its ingot capacity has increased more than six-fold since 1939 with the recent completion of the first stage of the Kemano-Kitimat power and smelting undertaking, in British Columbia.

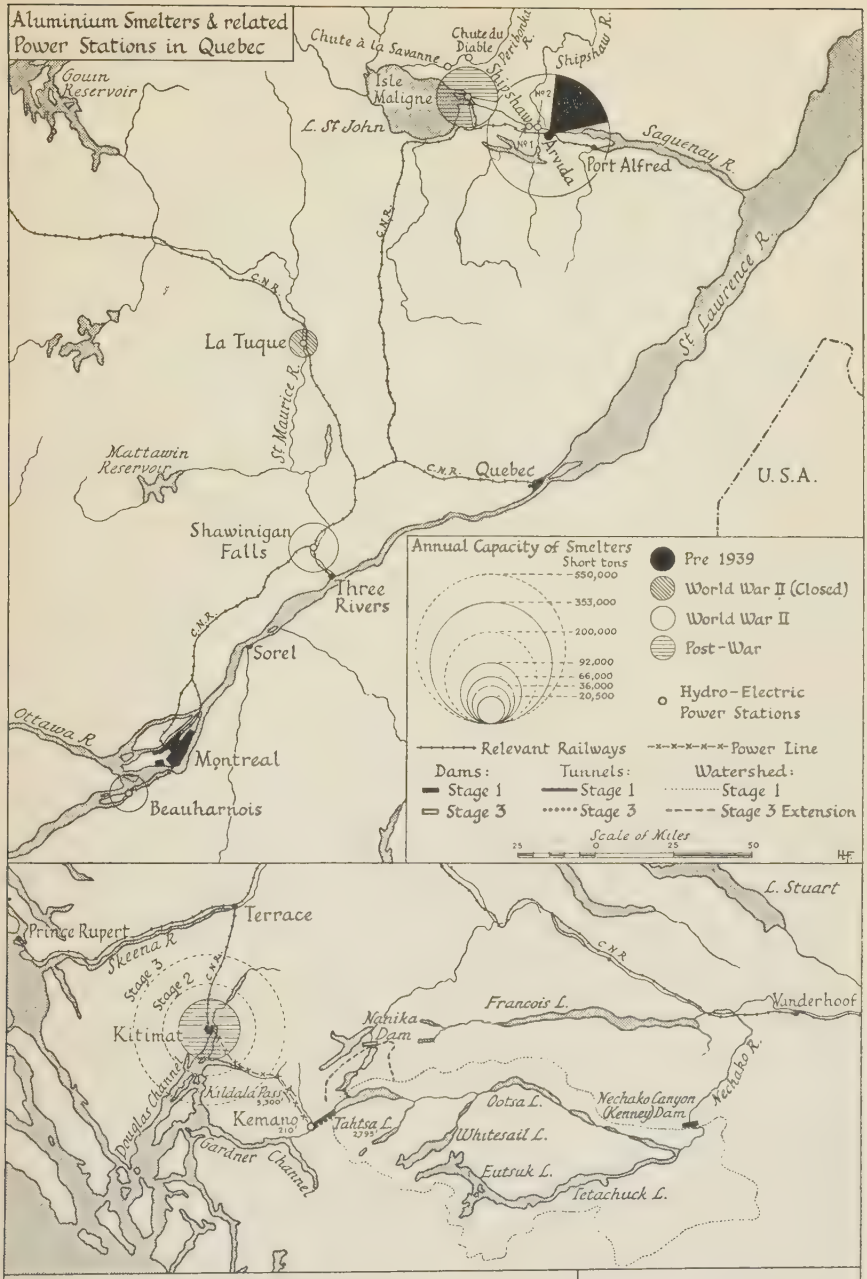
In 1939, the combined annual capacity of the original, but enlarged, smelter at Shawinigan Falls No. 1, on the St. Maurice River, and the first-stage installation at Arvida, on the Saguenay, was 99,000 short tons of aluminium ingots. In that year 83,000 tons were produced, 12 per cent of the world output, excluding the U.S.S.R. The rapid war-time expansion of Alcan gave a peak production of 496,000 tons in 1943, 24 per cent of the allied nations' output. This expansion involved:—

1. An increase of smelting capacity at Arvida to 353,000 tons per annum. The required power was obtained from the temporary addition, in 1942, of two 65,000 h.p. generators to the 300,000 h.p. already installed at Shipshaw No. 1, and the rapid construction of the 1,200,000 h.p. Shipshaw No. 2 power station. The first two of the twelve generators at Shipshaw No. 2 were turned over in November, 1942.

2. The installation of new smelters, related to existing power stations, at Isle Maligne at the outlet to Lake St. John, at Shawinigan Falls No. 2 and La Tuque on the St. Maurice River, and at Beauharnois on the St. Lawrence, above Montreal. Smelting capacities are shown on the map.

The import of bauxite from British Guiana, and of other raw materials, was centralized at the tidewater harbour of Port Arthur. Arvida was equipped with plant for processing these raw materials including the extraction of alumina from bauxite. Distribution to the other smelters was made by rail and river.

The Beauharnois and La Tuque smelters, and to some extent Shawinigan No. 2, were located with reference to sources of power made available because of the extreme importance of aluminium in war-time, and normally used in other industries. Thus, as a result of the 1945–7 recession in the aluminium industry, the La Tuque and Beauharnois plants were closed. Shawinigan No. 1 also ceased smelting in 1945 and is now concerned exclusively with fabricating while Shawinigan No. 2 was closed for a brief period. Production in 1946 was only 193,000 tons, though this accounted for 26 per cent of world output. Since 1948, there has been not merely a



[Note: Outline of lakes shown as before flooding to mean annual level of 2,795 feet]

Kemano–Kitimat Power and Smelting Sites

complete recovery but a further expansion of the industry. Shawinigan No. 2 smelter has been re-opened and its operation made more secure by the receipt of power from Isle Maligne and Shipshaw since 1952. The generating capacity of the Quebec Hydro station at Beauharnois was increased by 330,000 h.p. in 1950–1, and the Beauharnois smelter re-opened in the latter year. The Isle Maligne smelter has been enlarged to produce 92,000 tons of ingots a year. This increase was dependent on the installation of two new 270,000 h.p. power stations, in 1952 and 1953, on the Peribonka River. They bring the total generating capacity on the Saguenay and its tributaries, under the control of Alcan, to 2,580,000 h.p.

In 1952 the war-time peak output was exceeded with 499,800 tons, 26 per cent of the world total. By 1953, with the completion of the Quebec expansion programme, the four active smelters could produce 547,000 tons a year. Thus, with an output in 1953 of 545,800 tons, the industry was working to capacity. Requirements of bauxite were met by increased production in British Guiana, and by the new mining concession in the Los Islands, French West Africa. Sales of ingot aluminium in 1953 totalled 549,700 tons of which Canada consumed 16 per cent, the U.S.A. 43 per cent and the U.K. 34 per cent.

Full capacity production in Quebec, the less economic location of those plants not on the Saguenay, and the prospects of an expanding world market for aluminium, led to a search for a new, large-scale power and smelting site. British Columbia was selected and work started on the Kemano-Kitimat project in 1951. This has involved damming the Nechako River to produce a continuous lake storage system with a mean annual level of 2,795 feet. The flow has been reversed westwards from Tahtsa Lake by means of a tunnel, 10 miles long and 25 feet wide, driven through the Coast Range to the Kemano Valley. From the tunnel, the water passes down through the penstocks to the power-house, built underground within the valley side, and discharges into the Kemano River. The turbine intake is at 210 feet above sea level. Thus the effective head of water is over 2,500 feet. In the first stage of development, completed in August 1954, this head of water is driving turbo-generators with a capacity of 450,000 h.p., which provide power for a smelter of 91,500 tons capacity sited on the delta of the Kitimat River. The first ingot was produced on 3rd August, in the presence of H.R.H. The Duke of Edinburgh; and the first shipment of aluminium left Kitimat, for the U.S.A., on 30th September. An output of the order of 18,000 tons is anticipated for 1954.

Provision has been made for two further stages of development. The basic construction work necessary for the second stage was carried through with the initial programme, and in October, 1954, plans were announced for the immediate installation of a fourth generator of 140,000 h.p. at Kemano and an increase of 65 per cent in the smelting capacity at Kitimat. This latter increase will make possible an annual production of 150,500 tons of ingots. The further power and smelting installations involved in the third stage will bring the generating capacity to 2,240,000 h.p. and the ingot capacity to 550,000 tons a year. This stage will require an extension of the water catchment and the construction of additional dams and tunnels, as shown on the map. Largely to serve Kitimat, Alumina Jamaica Ltd. is mining extensive bauxite concessions in Jamaica. The bauxite is converted to alumina on the island and shipped via the Panama Canal, in Alcan's own vessels, to the newly-constructed, ice-free, tidewater harbour of Kitimat, alongside the smelter. (Acknowledgement is made of information kindly provided by Aluminium (Canada) Ltd.).

University of Bristol. J. W. Birch

The Geographical Association

ANNUAL REPORT 1954

The year's activities have been sadly clouded by the death of our immediate Past-President, Dr. O. J. R. Howarth, which occurred only a few weeks after he had been with us at the Spring Conference, where he presided at many of the meetings. We recall also, with deepest regret, the death of Sir John Linton Myres—one of the best friends the Association has known, and a past President and Trustee who on many occasions has been a tower of strength in difficult times.

In special measure our warm thanks are due to our President, Professor Wooldridge, who, despite serious illness, has attended most diligently to the business of our executive committee meetings and the work at headquarters. We are delighted to learn of his improved health after so serious a setback. It has indeed been of the greatest assistance to headquarters that Mr. Suggate, our President-elect for 1955, was able to shoulder some of the President's burdens, and we now extend to him a very warm welcome as he assumes office for the forthcoming year.

During the past year our affairs have prospered in most respects. Membership continues to increase, and at the close of the financial year was 3,739 (as compared with 3,383 in 1953 and 3,092 in 1952); of these, 595 were student members (compare 520 in 1953). We hope that this steady rise in membership during the past few years will be sustained.

The financial position has not been an easy one. Rising costs have further widened the gulf between income from subscriptions (£1,937) and our necessary expenditure (£3,500), but with truly Herculean efforts on the part of several members, and of our office staff, we have managed not only to pay our way but also to build up our reserve funds. We look forward to easing this all but intolerable financial strain when the subscription is increased to one guinea next September. The Honorary Secretary meanwhile expresses the warmest thanks to the large majority of members who have voluntarily paid a subscription at the new rate for the period 1954–55.

We have been greatly indebted to Professor Balchin for his organization of the Annual Conference held in 1954 and, jointly with Mr. Honeybone, in 1955. Our thanks must also be extended to the Officers and Local Committee of the Exeter Branch for the delightful and informative Spring Conference that was arranged by them in April. Our Summer School, which now seems to be an annual event, was, this year, a new venture in that it was held abroad at Sistrans, near Innsbruck. Under the able leadership of Mr. Honeybone and Dr. Sinnhuber, it was attended by no less than 54 members and it was undoubtedly a most successful meeting. Our staff at headquarters under the very competent direction of our Assistant Secretary, Miss Oughton, have carried out the considerable preliminary office work not only for the Summer School but also for a second party of members who attended the International Conference of Teachers of Geography held at Hilversum, during August. As an outcome of this meeting our Association's office has been adopted as the headquarters for the International Union of Associations of Teachers of Geography. As the central co-ordinating body, we now stand at the spearhead of both national and international organizations, responsible for the development and exchange of ideas amongst teachers of geography the world over.

These four conferences have not been this Association's only major activities. It may be remembered that, in our last annual report, preliminary plans were disclosed for the organization of short courses for teachers who have never specialized in geography but who are called upon to teach our subject. As a result of the Association's initiative (and after the circularizing of all Local Education Authorities and Institutes of Education in the country), a number of courses have been or are now being held in different parts of the country, staffed and organized by our members, and arranged either as short (generally weekend) residential courses specializing on field work, or as longer non-residential lecture courses on general teaching methods. Of the former category, courses have been held, sponsored by the Norfolk Education Committee at Wymondham College, by the Derbyshire Education Committee at Buxton, and by the Nottingham Institute of Education at Nottingham University. Of the second category, courses have been held at Manchester for the Lancashire Education Committee, and at the London Institute of Education. The latter which proved to be very popular was a ten-week course comprising one two-hour meeting held each week. In addition to these courses, several others are being organized independently by Local Authorities and Institutes of Education (e.g., at Leeds, Bristol and Reading), and we feel that in starting a widespread interest and demand for such courses the Association is helping to fill a most valuable educational need. To the many lecturers and teachers who have given time to the direction of these courses we extend most sincere thanks.

Branch Reports indicate continuing lively branch activity, though we would be glad to see a more even distribution of branches over the country. There are now forty-six local branches operating; five branches have been formed or are in process of formation since last we reported. Of the annual members, 63 per cent are affiliated to local branches.

The reports from branches contain much evidence of interesting and varied lecture programmes. Almost all reports describe the holding of at least one field excursion or geographical visit as an important item in branch activities. Some branches have organized attractive joint meetings, e.g. the Huddersfield and Leeds Branches made a joint excursion to visit North Yorkshire farms, and the Nottingham and Birmingham Branches organized exchange visits with each other; the York Branch has effected exchange visits both with Sheffield and with Hull. The Birmingham Branch organized a conducted excursion for 128 sixth-formers from 15 schools and was also responsible for a residential short course for teachers arranged in collaboration with the University of Birmingham (Extra-Mural Department) and attended by 36 students. Other large school visits have been organized by the Sheffield Branch who took 210 scholars to visit the Hull docks, and by the Liverpool and the Bolton Branches who have taken several *thousands* of scholars for Merseyside (and river) excursions! Visits to agricultural stations, meteorological and forecasting stations, and film shows fill the balance of most of the programmes, and indicate considerable energy and imagination on the part of branch secretaries and other local officers.

It is with real regret that we record the loss of two members prominent in these activities. Mr. P. Cannell Walton, a young teacher of distinction, and Honorary Secretary of the Norfolk Branch, died at the early age of 39; it was largely due to his enthusiasm and hard work that the Norfolk Branch was revived in 1951. We deeply regret also the loss of the Honorary President of the North Wales Branch. Dr. R. L. Archer, a life member of the Association, formed a link between the present and former Bangor Branches, and despite ill health, he continued throughout to take a real interest in branch affairs.

Branches have not this year made as much use as hitherto of headquarters' facilities for visits, or for school visits. We have, however, been delighted to offer hospitality and arrange for Sheffield works visits for members and schools, from York, Faversham, Pinner and Sowerby Bridge.

Our Section and other committees have had a busy and fruitful year, and the main items of business with which they have been concerned are reported below.

The Executive Committee and Council has dealt with a growing amount of normal and routine business. One item has been concerned with the changing regulations of the Scottish Universities Entrance Board and the effect of these on the status of geography in schools in Scotland. Action was taken jointly with the Royal Geographical Society and the Institute of British Geographers on this important matter.

A second matter has been concerned with the status of Geography in the examinations of the recently created Associated Examining Board. In this new examination, Geography and History may both be taken at the Ordinary Level, but at the Advanced Level, whereas both History and Economic History are recognized subjects, Economic Geography only has been offered for our subject. Both the President and Council of the Royal Geographical Society and your officers are independently submitting letters to the Board asking that provision be made for Geography, as well as for Economic Geography, as a subject for examination at the Advanced Level.

The Training College Section has held three one-day conferences. The first, held at the London Institute of Education, devoted two sessions to a discussion of the needs of teachers of geography in secondary modern schools, and the development of the new picture study research project. The latter is designed to discover facts about the ability of children to recognize features in the landscape and the relation between these and the human response. The project, organized by Miss Carr, is now supported by a team of fifty members in all parts of the country, and is testing the abilities of children in age groups from 11 to 15 years. The second conference, held at Loughborough College, was large concerned with the study of the local region. The third conference, held again at the Institute of Education, was devoted to further discussion on the organization of two-year training college courses in geography, and to excursions in Central London. Warm thanks are due to the Section for the part it has played in the organization and staffing of the courses (mainly for teachers in secondary modern schools) which have been referred to earlier in this report.

The Secondary Schools Section has been concerned with replies to numerous enquiries about books and syllabus problems—many from non-specialist teachers of the subject. Other work has included the provision of information on the teaching of geography in Britain for use at a conference held in Padua, Italy, and for the Commission on the Teaching of Geography of the International Geographical Union. There have been discussions at the several section committee meetings held, on the problems facing geography teachers in comprehensive schools; on the use of sample studies as a teaching technique, and on the position of geography in technical schools. The preparation of book lists for the guidance of teachers has occupied members throughout the year, and it is hoped that very full and comprehensive lists will be available at an early date, published by the Association.

The Public and Preparatory Schools Section has made its main activity the holding of a conference in April at Oxford, to discuss special teaching problems and aims within the Section. The conference was attended by more than seventy members, and its success was assured through the generous co-operation of Professor E. W. Gilbert and the staff of the Oxford School of Geography. The section has also collected information from members regarding the position of geography in the Public Schools Scholarship Examination papers, the results of which show that there still exists considerable variation in the degree of importance attached to the subject in Public Schools.

The Primary Schools Section has continued to hold discussion meetings each term, at which sample studies, recent publications in Primary School Geography, the construction and use of geographical models, have been the topics considered.

The Further Education Section has completed a preliminary survey of the status and scope of geography teaching in Technical Colleges. Difficulties concerned with work for the external degree of the University of London have been investigated, and an approach to the University has been made with regard to these. A memorandum on geography teaching and the relations between Technical Colleges and Universities is being prepared. It is hoped also that some of the field work carried out by different Technical Colleges may be co-ordinated by the section. In view of the scattered nature of the membership, in Institutions and Colleges concerned with Further Education, a regular News Sheet is to be instituted to keep members abreast of developments and interests connected with their work. It is felt that the most urgent problem which the section must face is concerned with the poor quality of many of the geography syllabuses used for examinations in Institutions for Further Education. Each of these syllabuses is now being discussed in turn, and, where it is felt that there are serious weaknesses, steps are being taken to meet the responsible bodies. All together, nearly forty different examinations are known to the section and others may well be brought to the notice of the committee in due course.

The Standing Committee for Urban Spheres of Influence reports a considerable expansion of its work during the past year. Distribution of the questionnaire forms which began in the grammar schools of southern England in 1949 has been extended by stages over the Midlands and has now reached the four northernmost counties of England. The tracts of the country that still remain to be covered are Yorkshire, Lancashire and the counties immediately adjacent to the south, Wales, and the southwest peninsula of England. The response by grammar schools has been enthusiastic and most encouraging and there are now no extensive gaps for that area for which there is general complete coverage. During 1954 the department of geography at Glasgow University has undertaken the organization of the extension of the survey to Scotland where a beginning has been made with the counties of Ayrshire and Renfrewshire. While the distribution and collection of forms has been under way, work has been proceeding on the experimental mapping of the information, as it has been collected. It is believed that almost all types of problem have now been met, and the decision has been reached that mapping to a uniform style may be undertaken on the scale of ½ in. to 1 mile. Some schools have availed themselves of the opportunity provided to make duplicate sets of forms, thus retaining a record of the data collected for their own school use. From these some teachers have devised their own exercises in mapping and analysis, and have sent copies of the results of their own pupils' work to the Chairman who is very glad at all times to see these.

The Standing Committee for Visual Aids has held frequent meetings during the year to discuss, among other topics, the publication of a pamphlet concerned with the use of pictures (moving and still) in the teaching of geography. The committee continues to give advice on a variety of matters resulting from enquiries about the use of visual aids.

The Standing Committee for Field Studies. It has been evident for some time that Field Studies will have an increasing rôle to play amongst the activities of the Association, and the further development of this important side of geographical teaching and activity ought to be considered. The increasing post-war attendances at our Spring Conferences and our Summer Schools both at home and abroad give impressive evidence of this. Council therefore has approved the creation of a new Standing Committee for Field Studies, under the chairmanship of Professor Wooldridge, and members may await with interest news of plans and developments emerging from this.

During the year there have been some changes amongst our officers. It is indeed with regret that we record that Mr. Warrington is relinquishing his dual office as Honorary Auditor and Honorary Librarian. Mr. Warrington is one of our few remaining senior members and we are deeply indebted to him for his long devotion to the Association's work; his assistance in the library, when it was in Manchester, and in the handling of the considerable enquiry-correspondence, has been continuous, and was especially valuable during the war years. Since the removal of the Association's headquarters and library to Sheffield in 1950, Mr. Warrington has frequently made the trans-Pennine journey, in all weathers, to continue work on the re-classification of our library, and to advise on many other matters. For this we extend our sincerest thanks. May we express the hope that he will continue to visit Sheffield for many years to come. The executive committee has nominated Mr. W. R. A. Ellis (Liverpool Branch) and Mr. L. J. Jay (Sheffield Branch) respectively to fill the vacancies of Honorary Auditor and Honorary Librarian.

Professor W. G. V. Balchin has felt unable to continue as Honorary Conference Organizer, consequent upon his removal from London to Swansea. His place will be taken by Mr. R. C. Honeybone, with the assistance of a member of the staff of the London School of Economics. Vacancies have occurred amongst our Trustees, and at the Council Meeting held in April, Professor L. Dudley Stamp was elected to fill one of these, and Professor E. G. Bowen and Professor W. G. V. Balchin have been nominated by the executive committee to fill remaining vacancies.

We extend to our retiring members of Council, Miss M. M. Alford, Professor H. C. Darby, Professor R. H. Kinvig, and Mr. W. R. A. Ellis, our warmest thanks for their services in this capacity. We are indebted also to Mr. Horrocks, who, from Manchester, continues to direct the ordering and despatch of special O.S. map orders for schools. To the members of our Editorial Board we are greatly indebted for the vigorous and progressive policy pursued during the past year. We look forward to seeing the "new face" which our journal is to show next year in the hands of its new printers, and with a newly-designed cover. We applaud especially the valuable work which Mr. Suggate continues to direct in the section in each issue of *Geography* devoted to "This Changing World."

Finally, in special measure must we thank our tireless Assistant Secretary, Miss Oughton, who with her staff at headquarters works so strenuously on our behalf, bearing the burden of the day. Few members are privileged to know how great a volume of miscellaneous business, book-keeping, and general correspondence (apart from the pressure of printing and editorial work) is continually transacted at our offices. Some indication of a small part of this may be estimated when it is realized that during the year nearly nine thousand receipts for cash are despatched; and this is only one side (and indeed a small part) of the work of our headquarters staff without whose efficient labours the life of the Association would quickly come to a standstill.

It is hoped that this report conveys to members something of the vitality and strength of our Association no less than the ever-expanding responsibilities that it comes to hold in the fields of education. Long may this continue, supported through the coming years by an ever-growing membership.

ALICE GARNETT
Honorary Secretary

December 1954

THE GEOGRAPHICAL ASSOCIATION

ACCUMULATED FUND—INCOME AND EXPENDITURE ACCOUNT for the Year ended 31st August, 1954

Dr.

	£ s. d.	£ s. d.	£ s. d.	1953 £
To *Geography*				
Printing and Publishing		1,616 13 11		1,223
Blocks	61 10 6			73
Less Authors' Contributions	26 5 10			
		35 4 8		
Postage		123 12 4		107
		1,775 10 11		1,403
Less Amount transferred from Publications Reserve Fund to cover extra cost of Diamond Jubilee issue of *Geography*		400 0 0		
			1,375 10 11	
,, Special Publications				
Stock at 1st September, 1953		141 9 1		162
Printing	113 4 5			
Less Receipts from Advertisements	36 10 0			
		76 14 5		79
		218 3 6		241
Less Stock on hand, 31st August, 1954 ..		175 12 8		141
			42 10 10	100
,, Printing and Stationery			262 8 4	175
,, Addressograph			18 19 11	16
,, Insurance			8 10 0	9
,, Salaries and National Insurance			1,122 10 1	930
,, Postage—General			218 17 1	161
,, Sundry Office Expenses			18 15 1	17
,, Library Expenses			31 16 6	71
,, Telephone			26 4 4	18
,, Bank Charges			23 11 0	26
,, Officers and Standing Committee Expenses			131 3 5	131
,, Donations and Subscriptions			15 0	1
,, Accountancy Charges			30 0 0	30
,, Subventions to Branches			36 12 0	46
,, Depreciation of Office and Library Furniture and Equipment			22 12 0	21
,, Transfer to General Reserve			110 0 0	
,, Balance, being Excess of Income over Expenditure carried to Accumulated Fund			10 8 9	5
			£3,491 5 3	£3,160

Cr.

	£ s. d.	£ s. d.	1953 £
By Sales of Publications, etc., and Royalty		355 6 4	257
,, Sales of Special Publications		378 17 4	342
,, Advertisements		400 3 0	396
,, Returned Library Postages		42 9 4	32
,, Subscriptions			
Current	1,937 16 6		1,706
Refund of Income Tax on Covenants ..	144 5 11		108
Arrears	14 19 0		17
		2,097 1 5	1,831
,, Interest on Investments and Building Society Deposits (Investments and Deposits held in Life Membership and Accumulated Funds)			
On Investments (Gross)	71 3 8		69
On Building Society Deposits	27 5 5		11
		98 9 1	80
,, Surplus on Conferences, *less* amount allocated to General Reserve		6 19 11	90
,, Life Members' Donations—Special Appeal ..	110 11 6		
Transfer to General Reserve	110 11 6		
,, Gifts		74 1 10	70
,, Sale of Library Books		20 0 0	60
,, Exchange of Publications (U.S.A. Subscriptions)		17 17 0	2
		£3,491 5 3	£3,160

MISCELLANEOUS MAPS ACCOUNT—INCOME AND EXPENDITURE ACCOUNT for the Year ended 31st August, 1954

Dr.

	£ s. d.	1953 £
To Stock at 1st September, 1953	210 12 6	208
,, Maps Purchased	76 15 1	72
,, Depreciation of Duplicator	3 9 9	4
,, Balance, being Excess of Income over Expenditure, transferred to Publications Reserve Fund	181 17 2	75
	£472 14 6	359

Cr.

	£ s. d.	1953 £
By Sales	319 10 7	148
,, Stock, 31st August, 1954	153 3 11	211
	£472 14 6	359

THE GEOGRAPHICAL ASSOCIATION

BALANCE SHEET **31st August, 1954**

	£ s. d.	£ s. d.	1953 £
ACCUMULATED FUND			
Balance as at 31st August, 1953	246 18 1		242
Add Surplus for the year as per Income and Expenditure Account	10 8 9		5
		257 6 10	247
GENERAL RESERVE	590 11 6		230
SUBSCRIPTIONS AND DONATIONS PAID IN ADVANCE	380 14 6		149
SUNDRY CREDITORS	625 1 4	1,596 7 4	1,528
		1,853 14 2	2,154
PUBLICATIONS RESERVE FUND			
Balance as at 31st August, 1953	1,261 17 0		1,165
Add Surplus on Map Sales Account	181 17 2		75
	1,443 14 2		1,240
Add Interest for the year	24 18 11		22
	1,468 13 1		1,262
Less Transfer to Income and Expenditure Account	400 0 0		
	1,068 13 1		
Sundry Creditors	10 11 0		
		1,079 4 1	
JUBILEE FUND			
Balance as at 31st August, 1953	891 15 10		907
Add Interest on Building Society Balance and Investments	26 16 8		27
	918 12 6		934
Less Deficiency on Diamond Jubilee Commemoration	1 13 6		42
		916 19 0	892
Carried forward		3,849 17 3	4,308

	£ s. d.	£ s. d.	£ s. d.	1953 £
ACCUMULATED FUND ASSETS				
Sundry Debtors		269 4 0		473
Stock of Special Publications		175 12 8		141
OFFICE AND LIBRARY FURNITURE AND EQUIPMENT				
Estimated Value, 31st August, 1951	150 0 0			
Additions since	114 0 4			
	264 0 4			
Less Depreciation to date	60 12 10	203 7 6		190
INVESTMENT, at par £200 3% Savings Bonds 1965/75 (Market Value, 31st August, 1954, £189 10s. 0d.)		200 0 0		200
Cash in hand	54 3 9			
Cash at Building Society	430 8 0			
Cash at Bank	520 18 3	1,005 10 0		1,150
			1,853 14 2	2,154
PUBLICATIONS RESERVE FUND ASSETS				
Duplicator, at cost	32 3 2			
Less Depreciation	12 7 10	19 15 4		23
Stock—Map Sets		153 3 11		211
Sundry Debtors		39 8 10		24
Cash at Building Society	1,198 15 6			
Less amount to be transferred to the Banking Account	331 19 6	866 16 0		1,004
			1,079 4 1	1,262
JUBILEE FUND ASSETS				
INVESTMENT, at par £820 3% Savings Bonds 1965/75 (Market Value, 31st August, 1954, £776 19s. 0d.)		820 0 0		820
Cash at Building Society	91 14 5			
Cash at Bank	5 4 7	96 19 0		72
			916 19 0	892
Carried forward			3,849 17 3	4,308

THE GEOGRAPHICAL ASSOCIATION

BALANCE SHEET—Continued

31st August, 1954

	£ s. d.	£ s. d.	1953 £
Brought forward		3,849 17 3	4,308
Life Membership Subscription Fund			
Balance as at 31st August, 1953	2,593 1 9		2,457
Add Subscriptions received during the year	278 7 0		136
		2,871 8 9	2,593
Herbertson Memorial Fund			
Balance as at 31st August, 1953	280 10 9		273
Add Interest for the year	8 1 4		7
		288 12 1	280
		£7,009 18 1	£7,181

		£ s. d.	£ s. d.	1953 £
Brought forward			3,849 17 3	4,308
Life Membership Subscription Fund Assets				
Investments, at par				
£1,646 4s. 2d. 3% Savings Bonds 1965/75	1,646 4 2			
£300 0s. 0d. 3% Savings Bonds 1955/65	300 0 0			
		1,946 4 2		1,946
£170 0s. 0d. 3½% Defence Bonds (Conversion Issue) 1964		170 0 0		170
		2,116 4 2		
(Market Value, 31st. August, 1954, £2,028 5s. 7d.)				
Cash at Building Society	731 0 3			
Cash at Bank	24 4 4			
		755 4 7		477
			2,871 8 9	2,593
Herbertson Memorial Fund Assets				
Investment, at par				
£250 3% Savings Bonds 1965/75		250 0 0		250
(Market Value, 31st August, 1954, £236 17s. 6d.)				
Cash at Building Society	23 12 1			
Cash at Bank	15 0 0			
		38 12 1		30
			288 12 1	280
			£7,009 18 1	£7,181

We have audited the above written Balance Sheet dated 31st August, 1954, and certify that in our opinion it is properly drawn up so as to exhibit a true and correct view of the position of the Association at that date, according to the best of our information and the explanations given to us, and as shown by the books of the Association.

(*Signed*) HOLMES, WIDLAKE & GIBSON,
Chartered Accountants,

W. H. HIMBURY,
Hon. Treasurer.

Sheffield.
6th October, 1954.

ANNUAL CONFERENCE, 1955

We place on record once again our grateful thanks to the Officers of the London School of Economics for the hospitality afforded us for our conference held in their buildings from January 4th to 7th.

The conference was attended by a very large gathering of members and lectures were crowded to full capacity. The programme included the discussion of some academic topics ("Liège and the Problems of Southern Belgium" by Mr. T. H. Elkins, and "Some Surrey Farms in the 18th and 19th Centuries" by Mr. D. J. Sinclair) but most sessions were devoted to problems concerned with the teaching of the subject. These included demonstrations and discussion of the techniques of school broadcasting in relation to the teaching of geography, by Mr. C. Armour of the B.B.C.; a demonstration lesson on Diagram and Map Making, by Miss I. V. Young (a most successful venture before an audience of several hundred members); a symposium on the problems of geography teaching and their relation to preparation for the University; a discussion on proposed examinations of the Associated Examining Board for the G.C.E.; a record of the work of the 1951 Schools' Exploring Society's expedition to Central Iceland, by Dr. F. G. Hannell; an account of the work of the Association's Summer School held last year in Austria; and, not least in this most valuable miscellany, an address by the retiring president, Professor Wooldridge, on the Status of Geography and the Rôle of Field Work.

We were delighted to welcome once again Professor Bryan, who, with his inimitable skill as both photographer and commentator, showed us another of his kodachrome films, presenting the North-East Yorkshire Moors, Wolds and Coast. To Mr. F. Spencer Chapman, D.S.O., we are also greatly indebted through the generous hospitality of the Royal Geographical Society, for a lecture on "African Journey," delivered at the Society's House and illustrated by colour films. Recent geographical films were demonstrated in a programme organized by our Standing Committee for Visual Aids. We enjoyed also the opportunities offered by a very comprehensive Publishers' Exhibition (one of the most valuable features of our Annual Conference), and the five visits and excursions arranged for the last day, to the Port of London, George Philip's map works, the Ordnance Survey, the St. Alban's area and the Rothamsted Experimental Station.

A record number of members attended the Annual Dinner, which must surely rank as the most successful ever held. We congratulate both Professor Balchin and Mr. Honeybone, the joint conference organizers, most warmly for organizing a conference notable for such pleasant opportunities for informal no less than formal meetings amongst teachers of geography in all educational spheres. We express our sincere thanks to the large number of members and others who contributed to a most successful and memorable conference.

SPRING CONFERENCE 1955, AT YORK

The Spring Conference will be held at York from April 12th to 16th. Programmes and booking slips were included with the last issue of *Geography*. Members who are without these, and who wish to attend should write at once for further information either to headquarters, or to the Honorary Conference Organizer, Mr. R. O. Smith, M.A., St. John's College, York.

SUMMER SCHOOL, AIX-EN-PROVENCE, AUGUST, 1955

Arrangements are now in progress for the holding of a Summer School at Aix-en-Provence, from August 11th to 26th. The party will be accommodated at the Cité Universitaire at Aix (through the kindness of the Recteur, Professor Jules Blache) and will study aspects of the physical, social and economic geography of Provence under the leadership of Mr. A. E. Smailes (Head of the Department of Geography at Queen Mary College, London) assisted by Dr. Harrison Church (London School of Economics) and Dr. Alice Garnett (University of Sheffield). It is essential that members wishing to participate in this meeting should register at the earliest opportunity; registration forms are obtainable from headquarters office.

SUMMER SCHOOL, SWITZERLAND, 1955

Owing to the small demand for such a meeting (in addition to that arranged for the south of France) the proposed field meeting in Switzerland is postponed.

GIFT OF BOOKS TO THE LIBRARY

The Honorary Secretary acknowledges with grateful thanks the gift of nine pounds for the purchase of books for the library. This sum was recently subscribed by members of the Lancashire and Cheshire Geography Teachers Group in appreciation of the work on their behalf of W. W. French Esq., H.M.I., who founded the Group in 1947 and organized its meetings until 1954. The titles of the books to which this gift will be devoted will be published in a later issue.

ANNUAL SUBSCRIPTIONS: INTRODUCTION OF NEW RATES

At the Annual General Meeting held on 5th January the motion to increase the Annual Subscription to one guinea was again approved and will therefore take effect as from 1st September, 1955. The Honorary Secretary wishes to take this opportunity of thanking the numerous members who have subscribed at the new rate for the current year.

LIFE MEMBERSHIP SUBSCRIPTIONS

The Annual General Meeting has approved the raising of the Life Membership Subscription to 20 guineas. Members of not less than twenty years' standing may compound at this new rate, deducting half a guinea for each year of full membership. On this basis any member who joins the Association at the age of 20 and retains full membership until the age of 60 automatically qualifies (i.e., in retirement) for Life Membership after that year.

Council is of the opinion that this concession should be brought into operation with respect to current membership at once, and that any members who have paid annual subscriptions continuously for 40 years should qualify for free Life Membership forthwith, regardless of the amount of the annual subscription rates with which they may have been concerned during that period. Will any members of 40 years' standing who wish to avail themselves of this facility please let us know at headquarters?

CORRECTION

The Honorary Editor draws the attention of readers to a mistake which occurred in the advertisement of H.M. Stationery Office facing p. 306 of the November 1954 issue of *Geography*. Owing to a printer's error, *The Meteorological Magazine* was wrongly advertised as *The Meteorology Magazine*. Apologies are tendered to H.M. Stationery Office.

LIBRARY REFERENCE BOOKS

In our need for new or spare copies of some current advanced reference books (sixth-form and university levels) it has been suggested that some members may be willing to give, or sell, to the library copies of books of which they are themselves no longer in need. Books which are required in the library occur both in the general (systematic) and the regional sections, e.g., Lobeck's or von Engeln's *Geomorphology* or *The Geography of Anglo-America* by White and Foscue; recent editions of these and comparable references would be most desirable. Members who would like to assist us in this way are asked to write to the Honorary Librarian informing him of the titles and date of publication of the books they could offer.

Reviews of Books

With very rare exceptions, books reviewed in this journal may be borrowed from the Library by full members or student library members of the Association.

Dartmoor (New Naturalist Series). L. A. Harvey and D. St. Leger-Gordon. 15 × 22 cm. xiv + 273 pp. London: W. Collins and Co. Ltd. 1953. 25s.

This admirable introduction to the natural history of the Dartmoor National Park can hardly fail to whet the appetites of those who make their first acquaintance of the Moor by way of its pages. But it falls short of the reasonable expectation of those who know the area or read the editors' preface wherein the volume is proudly presented as a "comprehensive regional synthesis."

The most successful parts of the book are those in which Professor Harvey treats of wild life in the several different habitats within the area; it is unfortunate that those valuable chapters succeed an incomplete and unsatisfying account of the physical background which is marred by many questionable and some absurd and meaningless statements. For instance, on p. 60 we are told that successive phases of uplift associated with the Alpine orogeny "created the series of raised beach-lines . . . . at 400, 800, 1,000 and probably 2,000 feet"; on p. 97 another "old shore-line" is added "at about the 1,200-foot contour" where "the river pauses before descending, sometimes headlong as in Lydford Gorge, into its deeply cut secondary valley." Quite apart from the fact that no abandoned shorelines have yet been identified on the Moor, the break of slope at the head of Lydford Gorge is at about 700 feet; and what is a secondary valley?

The two chapters by Mr. St. Leger-Gordon are written in a semi-popular vein (on p. 155 we meet "surface coal-mining") and add little to what has already appeared on the history of the area and its people.

Although the book is as well illustrated with monochrome and coloured plates as the best of its companion volumes it includes only three maps: one of the national park, the boundaries of which do not agree with those given in the text (p. 4); a geological map on which some outcrops are classified lithologically and some into formations (Roborough and Meldon Rocks are shown as lavas rather than intrusives and the Hatherleigh outlier is unshaded); and a map from Bellamy's *Natural History of Devon*, 1839—the only distribution map in the book. R. S. W.

Sandy Shores of South Lancashire. R. K. Gresswell. 14 × 22 cm. xii + 194 pp. Liverpool. Liverpool University Press Ltd. 1953. 30s.

The contents of this most useful book are best described by its sub-title "The Geomorphology of S.W. Lancashire." The author has had the courage to simplify his concepts, which has the attraction of making his book easy to understand, even though as an academic contribution it may suffer a little. He sketches with a bold pen the various Pleistocene shorelines, and, in the main, presents his evidence well, but he over-simplifies the interpretation of isostatic and eustatic movements. A good picture of the various platforms, raised beaches, and mosses is given, which suitably introduces the drainage problems of the southwest Lancashire plain. The long profile of the Ribble is rightly continued seawards (to the 22-fathom line) and in his account of the Ribble Estuary, as elsewhere, the author makes good use of old maps and charts.

The author is happiest in his treatment of the coastline which is the main part of the book. He aptly brings together both his published and unpublished material, and makes his book a valuable study in regional geomorphology. He is at his best in giving important new information based on his own observations such as that storm waves pocket a sandy beach, and do not produce the fulls usually attributed to them.

These form later during calmer weather. But the reviewer, for one, is glad that the author goes further and tries to explain many of the features he describes, even though these explanations are not always quite adequate. In his explanation of the fulls he develops further the points originally made by King and Williams, but one is puzzled by his repeated statement that waves are weaker on the upper than on the lower beach. His own profiles show that the beach is concave upwards, so that at high water there is a greater depth of water immediately offshore than at other times. This condition should give more, not less, powerful waves near the high water mark, as is normal. Also he refers to the Mersey dropping material to form banks in its estuary without giving any evidence as to whether it really comes from the river or from coast erosion. The author stresses the importance of dominant waves in moulding the shoreline, but he does not always acknowledge the papers from which he derives his ideas, and he is a little apt to refer to secondary sources. He is a little undiscriminating in applying this dominant wave hypothesis to the southwest Lancashire coastline. Good evidence is given that the strongest and most frequent winds come from the west, which is also the direction of the greatest fetch. Yet the most arresting feature of this section of the coastline is the prominent ness of Formby Point, a ness that long ago should have been straightened off by these dominant westerly waves had they had free play. The explanation lies, one thinks, in the effects of the great sand banks offshore on wave refraction, sand banks which the author shows have been present for at least several centuries. One suspects that the continued existence of Formby Point depends on the presence of Taylors Bank directly offshore to the westward, and that the small salient at Crosby is similarly due to the Great Burbo Bank.

In spite of these small criticisms this book is most informative to the teacher, the student, and the research worker, and the photographs, the diagrams and the book itself are a credit both to the author and to the University of Liverpool Press.

W.V.L.

Farming in Finland. W. R. Mead. 14.35 × 21.5 cm. xiv + 248 pp. London: University of London, The Athlone Press. Distributed by Constable and Co. Ltd. 1953. 30s.

Dr. Mead is now well known for his geographical work on Finland, and in this volume he presents his conclusions as to the agriculture. Following a short section on the physical environment, the author presents succinctly the problems of land reclamation—from waste and from forest—and the impact of the extensive resettlement which was demanded after the loss of territory during the Second World War. Throughout his account the reader is aware of the depth of knowledge and the skill with which the arguments have been presented. The force of the arguments has been strengthened by the excellent diagrams, while for those unfamiliar with the Finnish landscape, there is a series of excellent photographs. The Athlone Press is to be congratulated on the excellent style in which they have produced the first geographical study in their list of titles. All who are interested in the north will enjoy using this volume.

A. C. O.

Europe and the Mediterranean. N. J. G. Pounds. 18.5 × 25.5 cm. vii + 437 pp. London: McGraw-Hill Publishing Co. Ltd. 1953. 42s.

"This book has been written as a college textbook." The author, writing in the United States, has kept close to this brief. In macro-regional geography uniformity of attack is a fundamental virtue, and this book possesses it. Professor Pounds proves to be a reliable and level-headed guide to the very varied regions and topics which he is called upon to discuss. It is a pity that only 57 of the 421 pages deal with Europe as a whole, the point of view which is perhaps most needed at this standard of study. However, in five general chapters much information has been cleverly compressed.

Throughout the book the sections on physiography suffer greatly from an exclusion of geological terms and these might surely have been explained to the uninitiated by a short appendix. Though a multitude of well-reproduced photographs are aptly chosen to illuminate the text, there are a number of disappointments among the 246 diagrams. The nine diagrammatic sketches, designed to show relationships between structure and relief, are so simplified that they are not at all helpful; and some of the many useful diagrams are spoilt by unpleasing lettering and an under-emphasis of coastlines.

However, the text has none of these stylistic blemishes. It is relevant and readable, punctuated here and there by a graphic quotation, and a short useful bibliography concludes each section. J. H. B.

Report of a Mission to the Bechuanaland Protectorate to Investigate the Possibilities of Economic Development in the Western Kalahari, 1952. Commonwealth Relations Office. 15 × 25.5 cm. 50 pp. 4 maps. London: H.M.S.O. 1954. 5s.

A Mission was sent to Bechuanaland after preliminary enquiries had been conducted into vegetation by Dr. Pole Evans and into improvement of water supplies by Professor Debenham. The composition of the Mission encouraged confidence. Mr. Arthur Gaitskill is widely known for his work in the Gezira, Professor Pickwell of the University of Arizona is a specialist in the study of utilization of arid land, Tshekedi Khama and Chief Bathoen II have great reputations as leaders of African opinion, Mr. Curry is a respected rancher in Kenya and the name of Colonel van der Post is known to a wide public through his valuable and delightfully written studies of African life. The Mission recommends the organization of a pilot farm which could become a breeding centre for suitable cattle to replace the very mixed types now found. Ranches should be allocated to suitable men regardless of race, and should be so held that the responsible manager is on the spot and works with a local executive that helps with road-development, transport and improvement of water supplies. It is pointed out that new dirt roads need not be very costly and can give an immediate return through saving of petrol for transport. A difficulty is foreseen in that African cattlemen have been accustomed to grow cereals at home for food, and cereals are a heavy risk on Kalahari sand. There should be no legal difference in relations of African and European ranchers with the local executive. In fact the scheme has been thoughtfully devised on partnership lines. Of course a great deal will depend on its administration and one hopes that the old-established friendship in Bechuanaland between Africans and Europeans will be maintained and developed happily and that Tshekedi and Bathoen and others will find scope for their talents and will be able to co-operate fully with such men as Colonel van der Post.

The sheet maps in a pocket accompanying the report will be of value to students of the Kalahari. H. J. F.

The New West Africa: problems of independence. F. Le Gros Clark, H. Collins, T. Hodgkin and A. Okafor. 14 × 21.75 cm. 184 pp. London: G. Allen and Unwin Ltd. 1953. 15s.

This book deals with what Sir Philip Mitchell has called the "African agrarian, economic and social revolution" and with the problems arising from recent political developments. Several writers, some West African and some European, have collaborated to present a broad picture of the new West Africa by attempting to set it in its geographical and historical context and to indicate the nature of the political and economic forces at work today. Some readers will be annoyed by certain of the political inferences drawn, and disturbed by the criticisms of various aspects of British colonial policy, past and present, and of the American Point Four programme, for the book must be regarded as a political treatise rather than as an academic study. Yet it should be read carefully by all who are concerned with West Africa and its peoples, and special attention should be paid to F. Le Gros Clark's study of the conditions of technical progress. Geographers must overlook the badly-drawn and inaccurate map that forms the frontispiece, for these essays will give them much that is important but which has not yet appeared in the usual text-books and sources of reference. R. W. S.

Year Book and Guide to Southern Africa (with atlas). A. Gordon-Brown (ed.). 12.5 × 18.5 cm. lvi + 860 pp. + atlas, 48 pp. London: Robert Hale Ltd., for the Union Castle Mail Steamship Co. Ltd. 1954. 9s. 6d.

Year Book and Guide to East Africa (with folding map and atlas). A. Gordon-Brown (ed.). 12.5 × 18.5 cm. xxxii + 438 pp. + atlas, 16 pp. London: Robert Hale Ltd., for the Union Castle Mail Steamship Co. Ltd. 1954. 7s. 6d.

These companion Year Books and Guides, published annually by the Union Castle Line, are intended primarily for travellers and intending settlers, but comprise exceedingly useful and comprehensive reference works for geographers seeking factual information about the southern half of Africa. In each volume about half the space is devoted to geographical and general information, the rest to descriptions of selected travel routes. In the East Africa volume, after short historical accounts, each territory is given a separate section covering its political structure and administration, its peoples, topography, climate, natural life and economic affairs, together with much miscellaneous information. The British possessions are given most space, but useful summaries are included of all territories from Egypt to Portuguese East Africa, including the Belgian Congo. The South Africa volume is devoted mainly to the Union, but covers also the Protectorates, the Rhodesias and Angola. Twice the size of the East Africa volume, it treats most aspects of the geography of the Union in fair detail, with shorter sections on the other areas. The contents of both volumes are necessarily compressed and factual, but are clear and well set out. Both volumes are illustrated with diagrams, town-plans, and sectional layered topographic maps (generally at 40 or 80 miles to the inch) by John Bartholomew. The arrangement and contents are much as in the 1953 editions, but statistics have been revised (generally to 1952) and notes included on such recent developments as Mau-Mau, uranium working in the Union and new rail construction. For the prices charged, both volumes are exceedingly good value. R. F. P.

Minerals—a key to Soviet power. D. B. Shimkin. 14.25 × 21.75 cm. 452 pp. U.S.A.: Harvard University Press Ltd. London: Geoffrey Cumberlege at Oxford University Press Ltd. 1953. 52s.

This volume, one of the series of studies of the Russian Research Centre of Harvard University, reviews the statistics of mineral reserves, production and consumption of the Soviet Union. Special difficulties arise in the attempt to provide Soviet statistics for the last fifteen years, especially those of regional production, but Mr. Shimkin occasionally succeeds in presenting such figures for years as recent as 1950, e.g., Table 49—Coal and lignite production, by regions, 1913–50 (p. 176). The book is well arranged and an abundance of information, much of it in tables, is given clearly under the following heads: Ferrous Metals, Non-Ferrous Metals, Gold, Coal and Lignite, Petroleum, and Non-Metallic Minerals. The book includes a place-name as well as general index, and small-scale distribution and other maps; for convenience both maps and tables might have been listed. Mr. Shimkin has not neglected the mineral wealth of Soviet satellite countries in Europe and Asia and figures for foreign trade in minerals. The discussion frequently takes a comparative turn, and one of the appendices deals with mineral consumption and utilization in the United States. The book is objectively written and, while not a geography book, will prove a useful work of reference to geographers interested in this important aspect of Soviet wealth and strength.

The author sets out clearly the difficulties and limitations of his material. The scale of the varied mineral reserves of the U.S.S.R. has yet to be definitively measured. Expansion of mineral production has been remarkable during the last quarter century. Mineral output in 1950 had more than made good severe war losses and reached a level double that of 1944 and 60 per cent above that of 1937. The geographical distribution of mineral production continues to favour the vast area east of the Volga which accounts for half the total. Considerable progress in mining and refining technology has been made. While the rate of increase of Soviet mineral production exceeds that of the United States, Soviet output in 1950 was absolutely only about one-quarter that of the U.S.A. and U.S.S.R. remains a net importer of minerals. W. G. E.

Some Dependent Peoples of the South Pacific. L. A. Mander. 15 × 24.5 cm. xix + 535 pp. Leiden: Netherlands. E. J. Brill. 1954. Gld. 26 (50s.)

This is a valuable contribution to the literature of the South Pacific. It brings together the three fields of anthropology, history and colonial administration and is a secondary work of the first importance. It is clearly impracticable for anyone to gain an intimate knowledge of so diverse an area—the human span of "three score years and ten" alone makes such an achievement well-nigh impossible, and Professor Mander has followed the only practicable line. He has examined the relevant literature, and weighed the evidence of anthropologists, historians and administrators against observations made during residence in the territories under consideration.

The writer who attempts to bring together the three fields of anthropology, history and colonial administration runs a great risk (as the author himself admits), for the pitfalls in each field are many, and the opportunity for errors in judgment, as well as of fact, unlimited. However, somebody should co-ordinate their findings and Professor Mander does a difficult task extremely well. He has written a well documented and readable volume which will prove of inestimable value to teachers of geography and others seeking to understand the problems not only of the dependent peoples, but also of their administrators.

The peoples chosen for discussion are the aborigines of Australia, the Maoris of New Zealand, and the peoples of Papua, the Solomon Islands, the New Hebrides, Fiji, Western Samoa and Tonga. In each chapter the author describes the nature of the pre-European society, examines the effects of European colonization, and discusses the present problems of government in the territory surveyed.

The historical treatment is valuable; the author indicates in some detail how native institutions and beliefs were modified over a period of time—relatively short in some cases, much longer in others, by the forces of European civilization; much historical material has necessarily been omitted. Similarly the anthropological descriptions have had to be severely pruned, for the primary purpose of the study is to discuss the present problems confronting the governments of the peoples. The final chapter considers the problem of South Pacific regionalism as a whole and outlines the development of the South Pacific Commission.

As a work of reference this book should be in the library of every secondary school, as an essential aid to the study of the changing human geography of Melanesia, Micronesia and Polynesia. E. M. J. C.

Principles of Geomorphology. W. D. Thornbury. 16 × 22.25 cm. viii + 618 pp. London: Chapman and Hall Ltd. 1954. 64s.

This new American textbook of geomorphology is a well-written and important book. One outstanding feature is the formulation of a comprehensive framework of basic principles, in the context of which more advanced problems can be discussed. Elementary material is dealt with briefly, either among the basic principles or in the concise historical introduction. Where controversial issues preclude a straightforward enumeration of fundamental concepts, the lucidity of treatment is maintained by a clear statement of alternative hypotheses and their implications. Geophysical topics are omitted. Though this is a natural reflection of expansion and specialization in the remaining branches, it is a little to be regretted in a book which heavily stresses the rôle of earth-movement in interrupting the cycle of erosion.

The reduction of elementary matter and the exclusion of geophysics provides unusual space for the remaining fields. The result, however, is not a mere elaboration, but a solid addition—for example, mass movement, the geomorphological significance of soils, meteorite craters and the economic application of geomorphology. Apart from these the book is profusely furnished with fresh examples, interestingly documented with maps and well-chosen photographs, which point out the argument with the same clarity as the text.

Discussion and selection of terminology is commendable. Perhaps the most serious, among a few weaknesses, is an inadequate approach to the theory of grade.

This book may be recommended strongly to University students, and also for sixth-form libraries, though it is too advanced for use as a basic school textbook.

A. C.

Structural and Field Geology. 6th Edition Revised. J. Geikie. 14.5 × 22.75 cm. xxiv + 397 pp. Edinburgh: Oliver and Boyd Ltd. 1953. 37s. 6d.

Outlines of Structural Geology. E. Sherbon Hills. 12.5 × 19 cm. xi + 182 pp. London: Methuen and Co. Ltd. 1953. 12s. 6d.

The first of these books is little more than a reprint of the fifth edition (1940), with a few new plates. It is divided into three sections, dealing with the basic principles of petrology, rock structures and geological mapping. It is written in simple language, but hardly touches upon recent developments.

Professor Hills's book on the other hand has been extensively revised since the last issue of 1944, with better quality paper and redrawn diagrams. Many important additions have been made to the chapters concerned with sedimentation, major crustal features and folding, together with some judicious pruning. It provides an authoritative statement of the present knowledge and ideas concerning structural geology and will be specially useful for university students reading geography and geology. It will also serve as a reference book for advanced students and their teachers in grammar schools. G. T. W.

Maps and their Makers: an introduction to the history of cartography. G. R. Crone. 12 × 19 cm. xiv + 181 pp. London: Hutchinson's University Library. 1953. 8s. 6d.

Maps are fascinating subjects for study. Mr. Crone's introduction to the history of map making seeks to trace the general course of development of the map from the Ancient World to the present-day. It is an authoritative work, and teachers of geography will find it an informative volume in handy format. Especially useful for the teacher are the chapters on "the British Contribution in the Eighteenth Century" and "National Surveys," and the two appendices—lists respectively of general works on cartography and of reproductions of early maps and charts. The book suffers from one defect only; it does not contain even one reproduction of an early map, or even a portion of one, however small. Instead there are seven line drawings depicting the outlines of some important maps; unfortunately these give the lay-student, for whom the *Hutchinson's University Library* was intended, no idea of the beauty of early maps or of the progress made in the development of the map, since all the line drawings are in uniform style. E. M. J. C.

A New Map of the World. T. Edwards. 15 × 23.25 cm. 18 pp. London: B. T. Batsford Ltd. 1953. 5s.

The publisher's announcement on the cover that "the author . . . is not a professional geographer, but a politically minded mathematician and architect" explains much but it does not make the result any more acceptable. Here is simply a cylindrical equal area projection with two standard parallels and possessing all the well-known disadvantages of this type—attenuation of Africa and South America, north-south compression and east-west elongation of Canada, northwest Europe and the U.S.S.R. and a long thin ribbon for Antarctica. No one but the author and publisher could seriously claim for the outline maps that the "projection has an effect of balance and of normality." Within the text there are errors that simply should not appear in a work of this kind, e.g., on p. 2 there is no appreciation of the special property of a Mercatorial bearing, the assumption being that it is the same as a true bearing; on p. 11, Gall's projection is stated to be "stereoscopic." It is impossible to encourage the author in his hope that "the map, as shown here, is likely to be generally acceptable" and this slim pamphlet of text seems to be very highly priced. N. P.

Grasses. C. E. Hubbard. 11 × 18 cm. xii + 428 pp. Harmondsworth: Penguin Books Ltd. 1954. 3s. 6d.

Here at last is the almost ideal handbook for the identification of British grasses. In it are described and admirably illustrated, *all* the species indigenous to or naturalized in the British Isles. Completeness is most desirable in any such handbook, for the exclusion of any species can cause endless annoyance to beginners and advanced workers alike. For the student with little botanical knowledge the full-page illustration of each grass and its parts, together with an accompanying page of description and comment, should afford adequate if not generous means of identifying a reasonable specimen. The author's descriptions are likely to urge the diligent student to further anatomical study (for which admirable guidance is given in the book), and so to the use of the carefully planned "keys" to both floral and vegetative characters of the grass species. The plant geographer is particularly well served in the lists of species under each of fourteen habitats. These might indeed constitute the best possible approach for the geographical observer to the forbidding but highly important subject of grass identification. G. E. H.

Planned Management of Forests. N. V. Brasnett. 14 × 22 cm. 238 pp. London: Allen and Unwin Ltd. 1953. 20s.

The author's theme is the planning of policies by which forests shall be managed. While emphatic that a carefully considered plan is needed he shows that this should be neither so rigid as to be unalterable with change of circumstances nor so flexible that any ill-conceived enthusiasm can change it. The theme is developed in three phases. The first part introducing the subject shows the complexity of forestry and the need for planning. The major part of the book deals with the techniques and considerations involved in constructing working plans. The third part is a review of the history of European forest policies. As a text book designed for the student it has a technical approach. The general reader may find the third section of most interest. R. C.

Oxford Economic Atlas of the World. *Economist* Intelligence Unit and the Clarendon Press Cartographic Department. 19.5 × 20.5 cm. 112 pp. maps etc. + 152 pp. summary index. London: Oxford University Press Ltd. 1954. 30/-.

This atlas is an admirable statistical supplement to the Oxford Atlas and the precursor of a proposed series of regional economic atlases which are clearly destined to become a standard work of reference. It includes:

(1) essential reference maps (world soils, climate, vegetation and continental relief);
(2) world distribution maps of some 150 commodities and industries, population and communications; each supported by explanatory text, statistical tables and diagrams relating to production and trade;
(3) a statistical summary (146 pp.) for each country or territorial group in alphabetical order.

The whole work has been ingeniously set out to present an immense mass of data in visual or readily accessible form. A particularly welcome feature is the use of standardized dots and squares for maps and diagrams respectively. Four colours have been used to conserve space and facilitate reading (e.g., different colours for exports and imports). All figures have been taken from standard sources, and refer in general to a three-year average (usually 1936–8 and 1948–50 or 1949–51).

Scope for future development is indicated by the absence of maps relating to land use, labour, national income and related topics. Except for this one limitation, that it is essentially commercial rather than economic, the atlas will save teachers and students many hours of toil in the simpler forms of statistical analysis and provide a starting point for more searching enquiry into the nature and causes of regional variations in economic life.

A. J. H.

A GEOGRAPHY OF EUROPE *Second Edition*

By JEAN GOTTMANN, *Princeton University.*

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